kontron

» Kontron User's Guide «

KTQM87/mITX

KTD-N0886-A

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Document Revision History

Revision	Date	By	Comment
A	12-1-2015	MLA	LVDS panel support description improved. Cooler PN corrected. Note -12V use. Added PEG Bifurcation info. Added BIOS section. EXT_BAT max. 3.47 V. BIOS section added. Added more DP adapter info.
0	6-11-2013	NRM/MLA	Preliminary version

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Before Contacting Support: Please be prepared to provide as much information as possible:

- CPU Board
  1. Type.
  2. Part Number (find PN on label)
  3. Serial Number if available (find SN on label)
- Configuration
  1. DRAM Type and Size.
  2. BIOS Revision (find the version info in the BIOS Setup).
  3. BIOS Settings different than *Default* Settings (refer to the BIOS Setup section).
- System
  1. O/S Make and Version.
  2. Driver Version numbers (Graphics, Network, and Audio).
  3. Attached Hardware: Harddisks, CD-Rom, LCD Panels etc.

If the Kontron Technology product seems to be defect and you want to return it for repair, please follow the guide lines from the following page:

http://kontron.com/services/rma-information/kontron-technology-a-s/

1 Introduction

This manual describes the KTQM87/mITX board made by KONTRON Technology A/S. This board will also be denoted KTQM87 within this Users Guide.

The KTQM87 board is based on the QM87 chipset, support 4th generation Intel® Haswell i7 -, i5 -, i3 2Core and 4Core mobile processors, and Celeron. See "Processor Support Table" for more specific details.

Use of this Users Guide implies a basic knowledge of PC-AT hard- and software. This manual is focused on describing the KTQM87 board's special features and is not intended to be a standard PC-AT textbook.

New users are recommended to study the short installation procedure stated in the following chapter before switching-on the power.

All configuration and setup of the CPU board is either done automatically or manually by the user via the BIOS setup menus. Only exception is the "Load Default BIOS Settings" Jumper.

Latest revision of this manual, datasheet, BIOS, drivers, BSP's (Board Support Packages), Mechanical drawings (2D and 3D) can be downloaded from here: http://www.kontron.com/products/boards-and-mezzanines/embedded-motherboards/mini-itx-motherboards/ktqm87-mitx.html

2 Installation Procedure

2.1 Installing the Board

To get the board running follow these steps. If the board shipped from KONTRON has already components like RAM and CPU cooler mounted, then relevant steps below can be skipped.

1. **Turn off the PSU (Power Supply Unit)**

Warning: Turn off PSU (Power Supply Unit) completely (no mains power connected to the PSU) or leave the Power Connectors unconnected while configuring the board. Otherwise components (RAM, LAN cards etc.) might get damaged. Make sure only to use standard ATX PSU running the board with non-compliant ATX PSU may damage the board within minutes.

2. **Insert the DDR3 DIMM 240pin DIMM module(s)**
   Be careful to push it in the slot(s) before locking the tabs. For a list of approved DDR3 DIMMs contact your Distributor or FAE. See also chapter “System Memory Support”.

3. **Cooler Installation**
   Make sure the heat paste etc. on the cooler is intact and cover the full area of the CPU. Connect Cooler Fan electrically to the FANCPU connector.

4. **Connecting Interfaces**
   Insert all external cables for hard disk, keyboard etc. A monitor must be connected in order to change BIOS settings.

5. **Connect and turn on PSU**
   Connect PSU to the board by the ATX+12V-24p and the ATX+12V- 4p connectors.

6. **Power Button**
   If the board does not start by itself when switching on the ATX PSU AC mains, then follow these instructions to start the board. Install the Always On Jumper in the Always On position or toggle the PWRBTN_IN# signal (available in the FRONTPNL connector), by momentary shorting pins 16 (PWRBTN_IN#) and pin 18 (GND). A “normally open” switch is recommended.

7. **BIOS Setup**
   Enter the BIOS setup by pressing the <F2> key during boot up.
   Enter “Exit Menu” and Load Setup Defaults.
   Refer to the “BIOS Configuration / Setup“ section of this manual for details on BIOS setup.

Note: To clear all BIOS settings, including Password protection, activate “Load Default BIOS Settings” Jumper for ≈10 sec (without power connected).

8. Mounting the board in chassis

Warning: When mounting the board to chassis etc. please notice that the board contains components on both sides of the PCB which can easily be damaged if board is handled without reasonable care. A damaged component can result in malfunction or no function at all.

When fixing the Motherboard on a chassis it is recommended using screws with integrated washer and a diameter of ≈7mm. Do not use washers with teeth, as they can damage the PCB and cause short circuits.

2.2 Requirements IEC60950

Take care when designing chassis interface connectors in order to fulfil the IEC60950 standard.

When an interface or connector has a VCC (or other power) pin which is directly connected to a power plane like the VCC plane:
To protect the external power lines of the peripheral devices the customer has to ensure:

- Wires have suitable rating to withstand the maximum available power.
- That the enclosure of the peripheral device fulfils the fire protecting requirements of IEC60950.

Lithium battery precautions

CAUTION! Danger of explosion if battery is incorrectly re- placed. Replace only with same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instruc- tions.	**VORSICHT!** Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch den selben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Anga- ben des Herstellers.
ATTENTION! Risque d'explosion avec l'échange inadéquat de la batterie. Remplacement seulement par le même ou un type équivalent recommandé par le producteur. L'évacuation des batteries usagées conformément à des indications du fabricant.	**PRECAUCION!** Peligro de explosión si la batería se sustituye incorrectamente. Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante. Disponga las baterías usadas según las instrucciones del fabricante.
ADVARSEL! Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.	**ADVARSEL!** Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.
VARNING! Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.	**VAROITUS!** Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan lalteval- mistajan suosittelemaan tyyppiln. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

3 System Specifications

3.1 Component main data

The table below summarizes the features of the KTQM87/mITX embedded motherboard.

Form factor	KTQM87/mITX: miniITX (170.18 mm by 170.18 mm), Height approx. 39 mm (35.5 mm from top of PCB board)
Processor	On board CPU variants Support 4rd Generation Intel® Core™ (Haswell Mobile) processors BGA 1364 (max 47W TDP) • Intel® Core™ i7 • Intel® Core™ i5 • Intel® Core™ i3 • Intel® Celeron 4x 5 GT/s point-to-point DMI interface to PCH and 2/3/4/6/8MB internal cache.
Memory	• DDR3 DIMM 240pin socket (2 sockets) • Support single and dual ranks DDR3 1333/1600MT/s (PC3-10600/PC3-12800) • Support system memory from 1x 1GB up to 2x 8GB. Notes: Less than 4GB displayed in System Properties using 32bit OS (Shared Video Memory/PCI resources is subtracted) • ECC supported
Chipset	Intel QM87 PCH (Platform Controller Hub) • Intel ® VT-d (Virtualisation Technology for Directed I/O) • Intel ® TXT (Trusted Execution Technology) • Intel ® vPRO • Intel ® AMT (Active Management Technology) version 9.0 • Intel ® A T (Anti-Theft Technology) • Intel ® HD Audio Technology • Intel ® RST (Rapid Storage Technology) • Intel ® RRT (Rapid Recover Technology) • SATA (Serial ATA) 6Gb/s and 3Gb/s. • USB revision 2.0 • USB revision 3.0 • PCI Express revision 2.0 • ACPI 3.0b compliant • Triple Display support (Triple Graphic Pipes) • Blue-ray HD video playback
Security	• Intel® Integrated TPM 1.2 support
Management	• Intel® Active Management Technology (Intel® AMT) 9.0

Audio	Audio, 7.1 Channel High Definition Audio Codec using the VIA VT1708S codec • Line-in and Line-out • Surround output: SIDE, LFE, CEN, BACK and FRONT • Microphone: MIC1 and MIC2 • SPDIF-Out (electrical Interface only) • On-board speaker (Electromagnetic Sound Generator like Hycom HY-05LF)
Video	Intel ® i3, i5 & i7 4rd Generation Mobile processors support Intel ® HD Graphics 4600. 3x digital display ports via the Intel® Haswell CPU: • 3x DP (DisplayPorts), comply with DisplayPort 1.2 specification. • HDMI panel support via DP to HDMI Adapter Converter. • DVI panel support via DP to DVI Adapter Converter. • VGA panel support via DP to VGA Adapter Converter. • LVDS panel support up to 2 pixel/clock 24 bit colors (VESA and JEIDA) • Triple independent pipes for Mirror or Triple independent display support • Triple independent pipes for triple independent or cloned displays are supported from OS. Any 3 displays via DP1, DP2, DP3 and LVDS can be used.
I/O Control	Via ITE IT8516E Embedded Controller via LPC Bus interface
Peripheral interfaces	• Four USB 3.0 / USB 2.0 on I/O area • Four USB 2.0 ports on internal pinrows • Two Serial ports (RS232) on internal pinrows • Four Serial ATA-600 (Two further SATA ports implements in mSATA connectors) • RAID 0/1/5/10 support
LAN Support	• 1x 10/100/1000Mbits/s LAN (ETHER1) using Intel® Clarksville WGI218LM Gigabit PHY connected to QM87 supporting AMT 9.0 • 1x 10/100/1000Mbits/s LAN (ETHER2) using Intel® *Pearsonville* I211AT PCI Express controller • PXE Netboot supported. • Wake On LAN (WOL) supported

Expansion Capabilities	• PCI-Express slots:
	  • Slot PCIex16 (Gen 2.0 & 3.0).
	  Support PEG Bifurcation 1x x16 (default) or 2x x8 or 1x x8 + 2x x4.
	  • 1x mPCIe/mSATA connector with USB 2.0 port
	  • 1x mPCIe/mSATA connector w.USB 2.0, support for 3G modem (SIM socket)
	• SMBus, compatible with ACCES BUS and I2C BUS, (via Feature connector)
	• SPI bus routed to SPI connector (BIOS Recovery module interface)
	• DDC/AUX Bus routed to DP connector (Auto detect to DDC when using passive DP to HDMI or DVI adapters)
	• 18 x GPIOs (General Purpose I/Os), (via Feature connector)
	• DAC, ADC, PWM and TIMER (Multiplexed), (via Feature connector)
	• WAKE UP / Interrupt Inputs (Multiplexed), (via Feature connector)
	• 3 Wire Bus for GPIO Expansion (up to 152 GPIOs), (via Feature connector)
	• 8 bit Timer output, (via Feature connector)

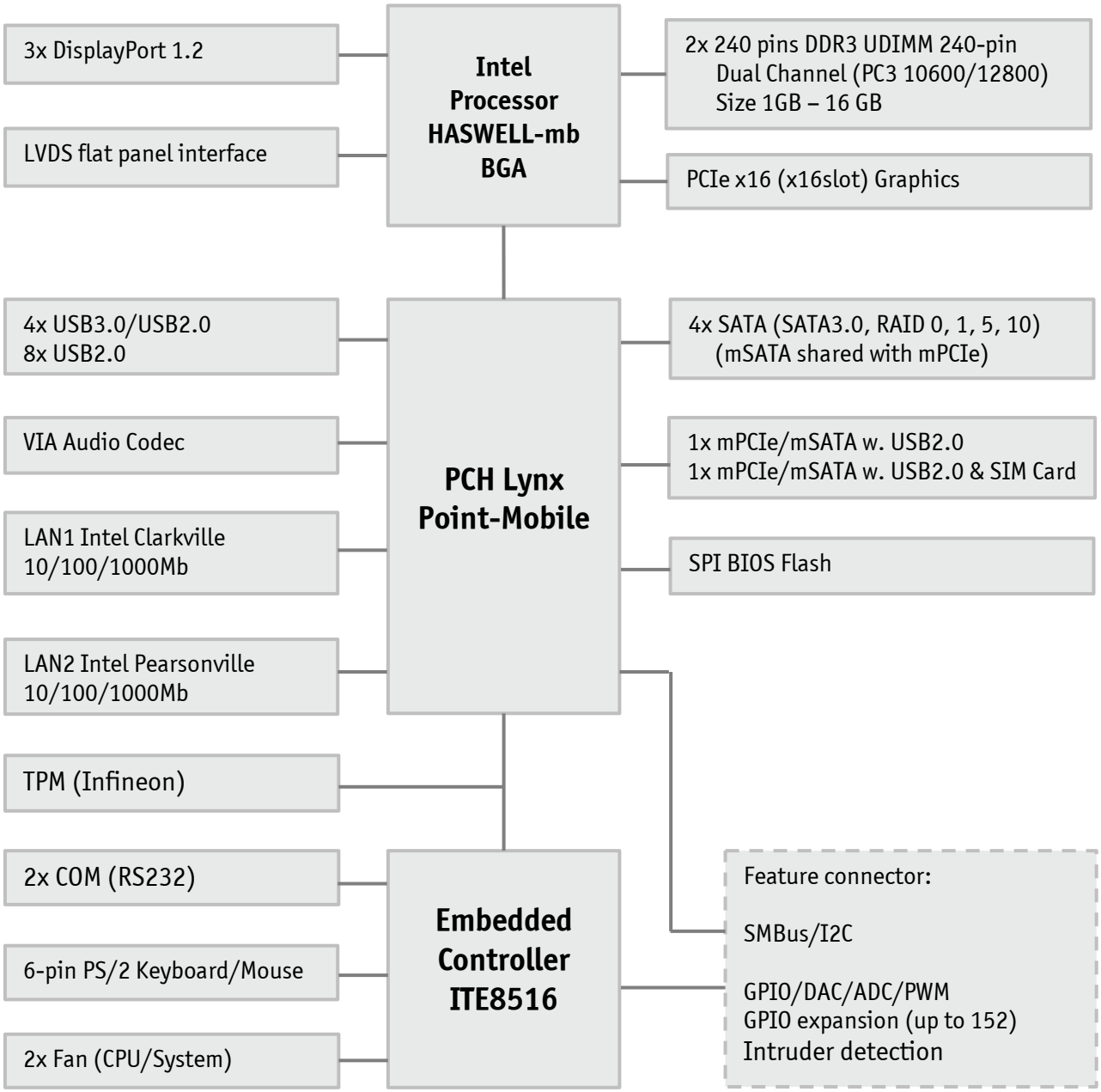
Hardware Monitor Subsystem	• Smart Fan control system, support Thermal® and Speed® cruise for two on-board Fan connectors: CPU Fan (on-board) and System Fan (on-board) • Thermal inputs: CPU Die temperature (precision +/- 3°C), System temperature (precision +/- 3°C) • Intrusion (Case Open) detect input, (via Feature connector) • Sleep S5# Indication, (via Feature connector) • System Powergood Signal, (via Feature connector)
Power Supply Unit	ATX/BTX (w. ATX+12V) PSU, 24-pin and 4-pin
Battery	Exchangeable 3.0V Lithium battery for on-board Real Time Clock and CMOS RAM. Manufacturer Panasonic / Part-number CR-2032L/BN, CR2032N/BN or CR-2032L/BE. Approximate 6.2 years retention. Current draw is less than 4.2µA when PSU is disconnected and 0 µA in S0 – S5. **CAUTION: Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

BIOS	• Kontron Technology / Phoenix BIOS (EFI core version)
	• Support for ACPI 3.0 (Advanced Configuration and Power Interface), Plug & Play
	  ◦ Suspend (S1 mode)
	  ◦ Suspend To Ram (S3 mode)
	  ◦ Suspend To Disk (S4 mode)
	• "Always On" BIOS power setting
	• RAID Support (RAID modes 0,1, 5 and 10)
	•

Operating Systems Support	• Windows XP (32b*, limited support may apply) • Windows 7 (32b + 64b *) • Windows 8 (32b + 64b *) • Linux • VxWorks • WES7 (32b + 64b) *= Out Of The Box installation test only.

Environmental Conditions	**Operating:** 0°C – 60°C operating temperature (forced cooling). It is the customer's responsibility to provide sufficient airflow around each of the components to keep them within allowed temperature range. 10% - 90% relative humidity (non-condensing) **Storage:** -20°C – 70°C; lower limit of storage temperature is defined by specification restriction of on-board CR2032 battery. Board with battery has been verified for storage temperature down to -40°C by Kontron. 5% - 95% relative humidity (non-condensing) **Electro Static Discharge (ESD) / Radiated Emissions (EMI):** All Peripheral interfaces intended for connection to external equipment are ESD/ EMI protected. EN 61000-4-2:2000 ESD Immunity EN55022:2006+A1:2007 class B Generic Emission Standard. **Electrical Fast Transients (EFT) (Burst):** EN 61000-4-4 Burst Immunity. **Safety:** IEC 60950-1: 2005, 2nd Edition UL 60950-1 CSA C22.2 No. 60950-1 Product Category: Information Technology Equipment Including Electrical Business Equipment. Product Category CCN: NWGQ2, NWGQ8. File number: E194252 **Shock:** IAW IEC 60068-2-27, Test Ea, shock, 18 shocks 3 per axis, 6 directions. Shock pulse 50g, 11ms halfsine. **Bump:** IAW IEC 60068-2-29, Test Eb, Bump, 3000 bumps, 500 per axis, 6 directions. Half Sine Waveform Acceleration 2g; Pulse Duration 11ms. **Vibration:** IAW IEC 60068-2-64, Test Fh, Random Vibration. 90 min per axis, 3 axes, at 1.9 grms, with PSD: 10-20 Hz: 0.05 g²/Hz and 20-500 Hz: -3dB/octave. **Theoretical MTBF:** 219.028 / 161.225 hours @ 40°C / 60°C for the KTQM87/mITX **Restriction of Hazardous Substances (RoHS):** All boards in the KTQM87 family are RoHS compliant. **Capacitor utilization:** No Tantalum capacitors on board Only Japanese brand Solid capacitors rated for 100 °C used on board

3.2 KTQM87 Block Diagram


3x DisplayPort 1.2
LVDS flat panel interface
Intel Processor HASWELL-mb BGA
2x 240 pins DDR3 UDIMM 240-pin Dual Channel (PC3 10600/12800) Size 1GB – 16 GB
PCIe x16 (x16slot) Graphics
4x USB3.0/USB2.0
8x USB2.0
VIA Audio Codec
LAN1 Intel Clarkville 10/100/1000Mb
LAN2 Intel Pearsonville 10/100/1000Mb
PCH Lynx Point-Mobile
4x SATA (SATA3.0, RAID 0, 1, 5, 10) (mSATA shared with mPCIe)
1x mPCIe/mSATA w. USB2.0
1x mPCIe/mSATA w. USB2.0 & SIM Card
SPI BIOS Flash
TPM (Infineon)
2x COM (RS232)
6-pin PS/2 Keyboard/Mouse
2x Fan (CPU/System)
Embedded Controller ITE8516
Feature connector:
SMBus/I2C
GPIO/DAC/ADC/PWM
GPIO expansion (up to 152)
Intruder detection

3.3 Processor Support Table

KTQM87 is designed to support the following BGA1364 Mobile processors:

4th generation Intel® Core™ i7 processor

4th generation Intel® Core™ i5 processor

4th generation Intel® Core™ i3 processor

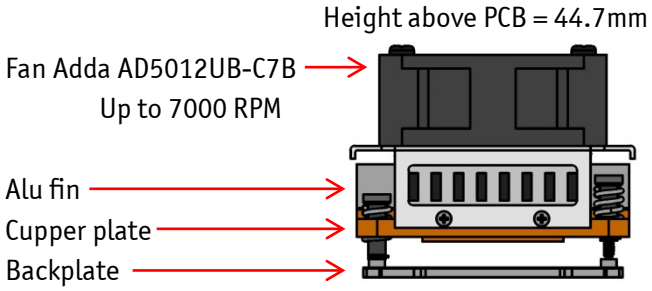
4th generation Celeron

The BGA CPU is premounted from factory. Kontron has defined the board versions as listed in the following table, so far all based on Embedded CPUs. Later other versions are expected.

KTQM87/mITX variants		CPU					
Name	Sales PN	Speed	Turbo	Embed.	Cache	Sspec	TDG/Tj
KTQM87/mITX i7-4860EQ	810554-4500	1.8GHz	3.2GHz	No	6MB	SR195	47W/100°C
KTQM87/mITX i7-4700EQ	810550-4500	2.4GHz	3.4 GHz	Yes	6MB	SR17L	47W/100°C
KTQM87/mITX i5-4400E	810551-4500	2.7GHz	-	Yes	3MB	SR17M	37W/100°C
KTQM87/mITX i3-4100E	810552-4500	1.6GHz	-	Yes	3MB	SR17N	37W/100°C
KTQM87/mITX Cel-2000E	810553-4500	2.2GHz	-		2MB		37W/

Sufficient cooling must be applied to the CPU in order to remove the effect as listed as TDG (Thermal Design Guideline) in above table. The sufficient cooling is also depending on the worst-case maximum ambient operating temperature and the actual worst-case load of processor.

The KTQM87&mITX is delivered with premounted cooler, the Kontron PN 1056-2605 “CPU Cooler KTQM87”:



3.4 System Memory support

The KTQM87/mITX has two DDR3 UDIMM sockets. The sockets support the following memory features:

- 2x DDR3 1.5V/1.35V UDIMM 240-pin
- Dual-channel with 1 UDIMM per channel
- From 1GB and up to 2x 8GB.
  Note: If using 32bit OS then less than 4GB in displayed in System Properties (Shared Video Memory/PCI resources is subtracted)
- Single/dual rank unbuffered 1333/1600MT/s (PC3-10600/PC3-12800)
- SPD timings supported
- ECC supported

The installed DDR3 DIMM should support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read and configure the memory controller for optimal performance. If non-SPD memory is used, the BIOS will attempt to configure the memory settings, but performance and reliability may be impacted.

Memory Operating Frequencies
Regardless of the DIMM type used, the memory frequency will either be equal to or less than the processor system bus frequency. For example, if DDR3 1600 memory is used with a 1333 MHz system bus frequency processor, the memory clock will operate at 167 MHz. The table below lists the resulting operating memory frequencies based on the combination of DIMMs and processor.

DIMM Type	Module name	Memory Data transfers [MT/s]	Processor system bus frequency [MHz]	Resulting memory clock frequency [MHz]	Peak transfer rate [MB/s]
DDR3 1066	PC3-8500	1066	1066 / 1333	133	8533
DDR3 1333	PC3-10600	1333	1333 / 1600	167	10666
DDR3 1600	PC3-12800	1600	1333	167	10666
DDR3 1600	PC3-12800	1600	1600	200	12800

Notes: Kontron offers the following memory modules:
1GB DDR3 1333 PC3-10600, P/N: 1031-9872
2GB DDR3 1333 PC3-10600, P/N: 1054-3702
4GB DDR3 1333 PC3-10600, P/N: 1054-3703
8GB DDR3 1333 PC3-10600, P/N: 1054-3704
1GB DDR3 1600 PC3-12800, P/N: 1054-3706
2GB DDR3 1600 PC3-12800, P/N: 1054-3707
4GB DDR3 1600 PC3-12800, P/N: 1054-3708
8GB DDR3 1600 PC3-12800, P/N: 1052-5601

Memory modules have in general a much lower longevity than embedded motherboards, and therefor EOL of modules can be expected several times during lifetime of the motherboard. Kontron guarantees that the above P/N will be maintained so that EOL module will be replaced by other similar type of qualified module.

As a minimum it is recommend using Kontron memory modules for prototype system(s) in order to prove stability of the system and as for reference.

For volume production you might request to test and qualify other types of RAM. In order to qualify RAM it is recommend configuring 3 systems running RAM Stress Test program in heat chamber at 60^0C for a minimum of 24 hours.

3.5 KTQM87 Graphics Subsystem

The KTQM87 equipped with Intel ® i3, i5 or i7 processor, supports Intel ® HD Graphics 4600, however the i7-4860EQ supports Intel Iris™ Pro graphics 5200. All KTQM87 versions support three DisplayPort directly from the processor. The DP interface supports the DisplayPort 1.2 specification. The PCH supports High-bandwidth Digital Content Protection for high definition content playback over digital interfaces. The PCH also integrates audio codecs for audio support over DP interfaces.

Up to three displays (DP1, DP2, DP3 & LVDS) can be used simultaneously and be used to implement independent or cloned display configuration. PCIe cards can be used to replace on-board graphics or in combination with on-board graphics.

Intel® HD Graphics 4600

Features of the Intel HD Graphics 4600 build into the i3, i5 and i7 processors, includes:

- High quality graphics engine supporting
  - 3 Symmetric Pipe Support
  - DirectX11.1 and OpenGL 4.x compliant and lower
  - Open CL 1.2 and lower
  - Core frequency of 350 - 1250 (Turbo) MHz
  - Memory Bandwidth up to 25.6 GB/s
  - Dynamic Video Memory Technology 5.0
  - DP 1.2 MST (Multi-Stream Transport)
  - PAVP
  - HDCP
  - Audio (Protected Content)
  - Full AVC/VC1/MPEG2 HW Decode
  - Full MVC HW Decode

- DP1, DP2 & DP3
  - 16/32bit colours in WQXGA 3840x2160 @ 60 Hz.
  - Max HDMI resolution 4096x2304 @ 24 Hz
  - DisplayPort standard 1.2

- LVDS
  - One or two pixels per clock, up to 1920x1200 24b bit colors.
  - 12V for backlight, up to 2.5A
  - 3.3V or 5V for panel power, up to 1.0A
  - PWM Brightness/Dimming
  - VESA and JEIDA color coding

Intel® HD Graphics 5200

The Intel Core i7-4860EQ support Intel Iris™ Pro graphics 5200 is almost the same as HD Graphics 4600, but it has 40 execution units instead of 20 units and also embedded DRAM (L4 cache is added).

3-displays Configurations:

Display1	Display2	Display3	Max resolution @60 Hz		
			Display 1	Display2	Display3
LVDS	DP	DP	1920x1200	3840x2160	3840x2160
LVDS	HDMI	DP	1920x1200	2560x1600	3840x2160
LVDS	HDMI	HDMI	1920x1200	2560x1600	2560x1600
LVDS	HDMI	DVI	1920x1200	2560x1600	1920x1200
LVDS	DVI	DP	1920x1200	1920x1200	3840x2160
LVDS	DVI	DP	1920x1200	1920x1200	3840x2160
HDMI	HDMI	DP	2560x1600	2560x1600	3840x2160
HDMI	DVI	DP	2560x1600	1920x1200	3840x2160
DVI	DVI	DP	1920x1200	1920x1200	3840x2160
DP	DP	DP	3840x2160	3840x2160	3840x2160
HDMI	HDMI	HDMI	Not allowed		
HDMI	HDMI	DVI			
HDMI	DVI	DVI			
DVI	DVI	DVI			

By DVI and HDMI means using “DP to DVI passive adapter” and “DP to HDMI passive adapter” respectively.

If using “Active adapter” it will be same as “DP” in above table.

DP Adapters

Use of DP Adapter Converters (3rd party accessories) can provide HDMI, DVI or VGA panel support.

The Kontron DP to VGA is the only active Adapter, so that both Kontron DP to HDMI and DP to DMI are passive adapters. The DP to HDMI supports the HDMI 1.4a specification including audio codec.

DP to VGA DP to HDMI DP to DVI
PN 1045-5779 PN 1045-5781 PN 1045-5780

Cable DP Extender cable 200mm
PN1051-7619

For alle the above adapter’s the maximum resolution is: 1920x1200. Extension cable available:

Alternative adapters with integrated cable are available:
KAB-ADAPT-DP-VGA, KAB-ADAPT-DP-HDMI and KAB-ADAPT-DP-DVI.

3.6 Power Consumption

In order to ensure safe operation of the board, the ATX+12V power supply must monitor the supply voltage and shut down if the supplies are out of range – refer to the actual power supply specification. Please note, In order to keep the power consumption to a minimal level, boards do not implement a guaranteed minimum load. In some cases, this can lead to compatibility problems with ATX power supplies, which require a minimum load to stay in regulation. The KTQM87 board must be powered through the ATX+12V-4p (4-pole) and the ATX+12V-24p (24-pole) connectors using standard ATX power supply.

ATX12V supply: Both ATX+12V-4p connector and ATX+12V-24p connector must be used in according to the ATX12V PSU standard.

Warning: Hot Plugging power supply is not supported. Hot plugging might damage the board.

The requirements to the supply voltages are as follows:

Supply	Min	Max	Note
VCC3.3	3.135V	3.465V	Should be ±5% for compliance with the ATX specification
Vcc	4.75V	5.25V	Should be ±5% for compliance with the ATX specification. Should be +5/ -0% to meet the USB standard.
+12V	11.4V	12.6V	Should be ±5% for compliance with the ATX specification
–12V	–13.2V	–10.8V	Should be ±10% for compliance with the ATX specification
-5V	-5,50V	-4.5V	Not required for the KTQM87 boards
5VSB	4.75V	5.25V	Should be ±5% for compliance with the ATX specification

Note: -12V is only used for COM ports (COM1 and COM2).

Total System power example

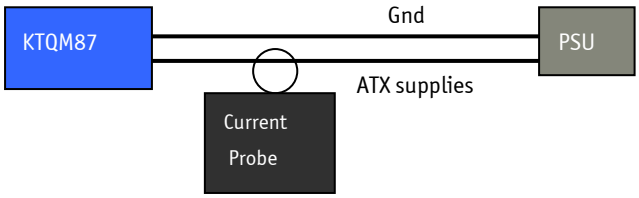
More detailed Static Power Consumption

On the following pages the power consumption of different boards in different configurations are listed. For each configuration the power consumptions result are listed in 5 tables:

1. Windows 7 Idle
2. Windows 7 3Dmark 2006
3. Windows 7 Intel TAT, 100% on all CPU cores and GFX
4. Windows 7 S3 (Sleep)
5. Windows 7 S5 (Shutdown)

The principal test system and test equipment used

1. Fluke 289
2. Fluke 179
3. ATX rail switch



Note: Power consumption of PSU (power loss), Monitor and HDD are not included.

KTQM87/mITX Low Power Setup:
Standard system configuration equipped with Internal graphics, 1x SATA disks, Intel i7-4700EQ CPU, 1x DIMM (4GB Module), DP Monitor, PS2 Keyboard & Mouse,1x 16GB USB 3.0 Stick, 12V active cooler, 400W ATX PSU.

KTQM87/mITX High Power Setup:
Standard system configuration equipped with PCIe x16 graphics card, mSATA 32GB, 4x SATA disks, Intel i7-4700EQ CPU, 2x DIMM (4GB Modules), DP Monitor, PS2 Keyboard & Mouse, 2x 16GB USB 3.0 Sticks, 2x 16GB USB 2.0 Sticks, 12V active cooler, 400W ATX PSU.

KTQM87/mITX Low Power Setup results:

Windows 7 – Idle			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.3	147	1.81
+12V_P4	12.3	305	3.75
+5V	5.21	450	2.34
+3V3	3.39	249	0.84
5VSB	5.07	0	0.00
Total			8.75

Windows 7 – 3DMark2006			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.23	320	3.91
+12V_P4	12.14	1658	20.13
+5V	5.2	850	4.42
+3V3	3.38	248	0.84
5VSB	5.07	0	0.00
Total			29.30

Windows 7 – Intel TAT 100% all CPU cores and GFX			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.19	319	3.89
+12V_P4	11.85	4039	47.86
+5V	5.2	1024	5.32
+3V3	3.36	247	0.83
5VSB	5.05	0	0.00
Total			57.91

Windows 7 – S3 (Sleep)			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
5VSB	5.07	184	0.93
Total (+12V, +12V_P4, +5V, +3V3 are all 0 mA)			0.93

Windows 7 – S5 (Shutdown)			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
5VSB	5.06	127	0.64
Total (+12V, +12V_P4, +5V, +3V3 are all 0 mA)			0.64

KTQM87/mITX High Power Setup results:

Windows 7 – Idle			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.25	730	8.94
+12V_P4	12.26	332	4.07
+5V	5.17	778	4.02
+3V3	3.35	2728	9.14
5VSB	5.06	0	0.00
Total			26.17

Windows 7 – 3DMark2006			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.2	1236	15.08
+12V_P4	12.21	1166	14.24
+5V	5.17	828	4.28
+3V3	3.34	3478	11.62
5VSB	5.05	0	0.00
Total			45.21

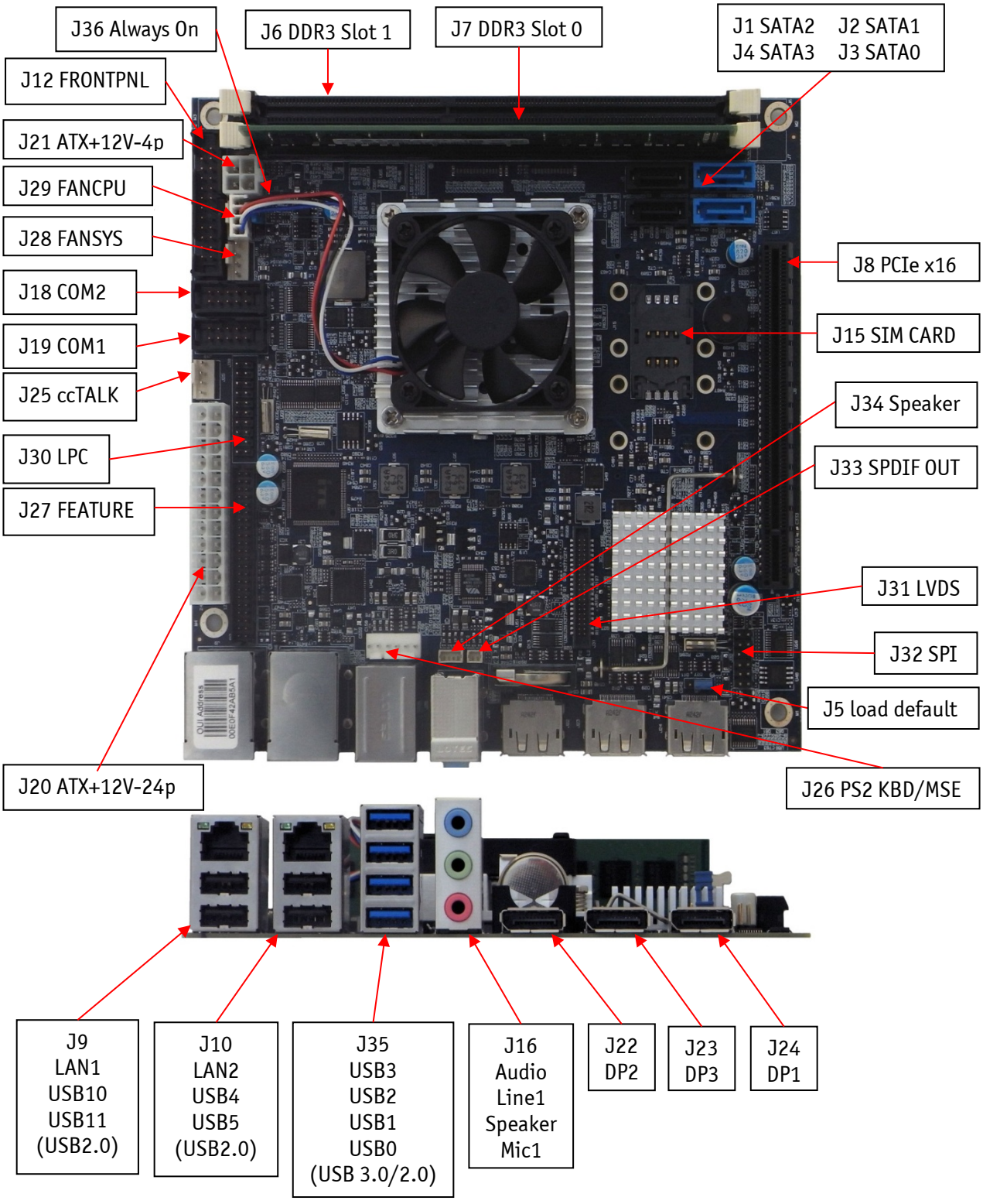
Windows 7 – Intel TAT 100% all CPU cores and GFX			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
+12V	12.1	1492	18.05
+12V_P4	11.97	3630	43.45
+5V	5.17	823	4.25
+3V3	3.32	3735	12.40
5VSB	5.05	0	0.00
Total			78.16

Windows 7 – S3 (Sleep)			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
5VSB	5.06	568	2.87
Total (+12V, +12V_P4, +5V, +3V3 are all 0 mA)			2.87

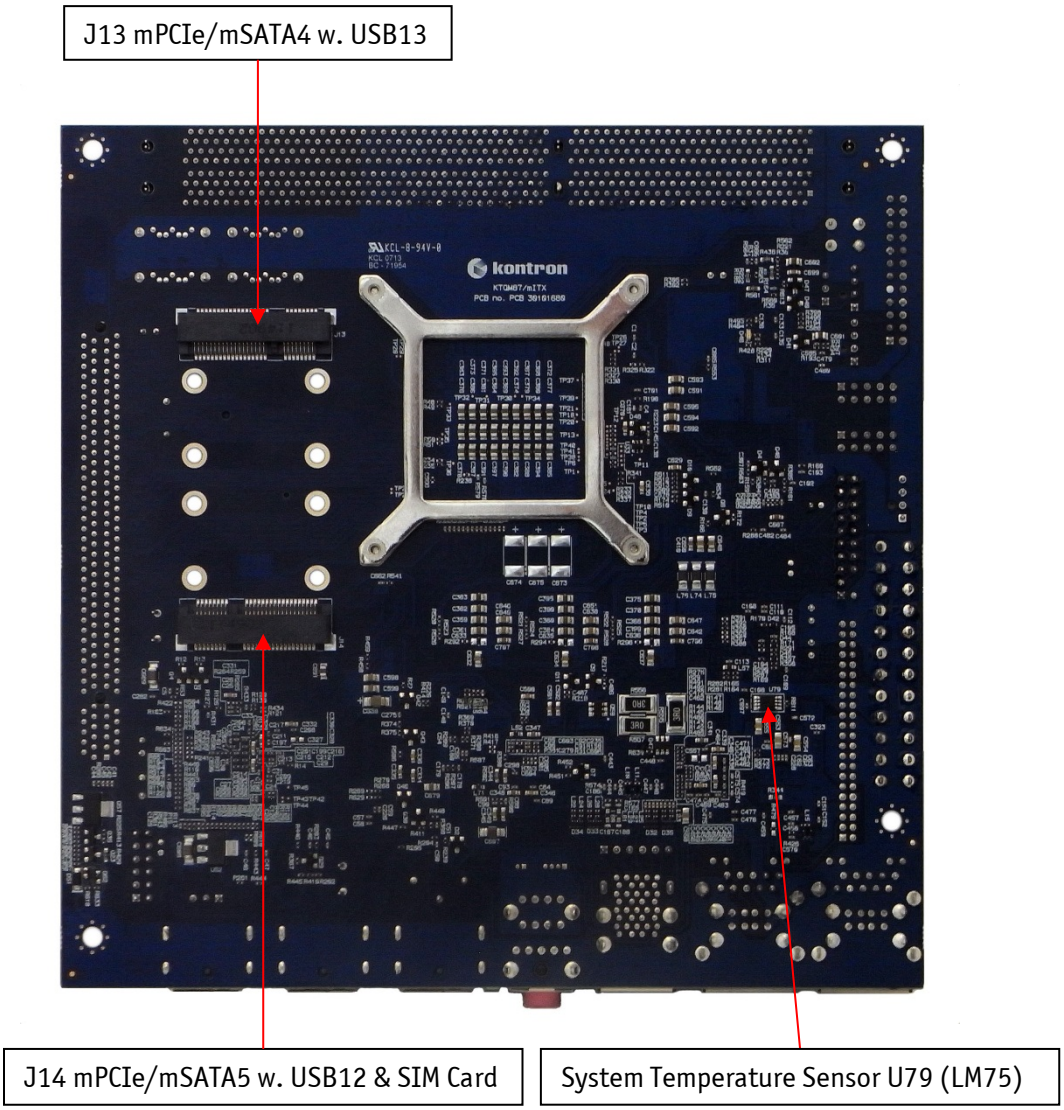
Windows 7 – S5 (Shutdown)			
Supply	Voltage / [V]	Current draw/ [mA]	Power consumption/ [W]
5VSB	5.06	663	3.35
Total (+12V, +12V_P4, +5V, +3V3 are all 0 mA)			3.35

4 Connector Locations

4.1 KTQM87/mITX - frontside



4.2 KTQM87/mITX - backside



5 Connector Definition

The following sections provide pin definitions and detailed description of all on-board connectors.

The connector definitions follow the following notation:

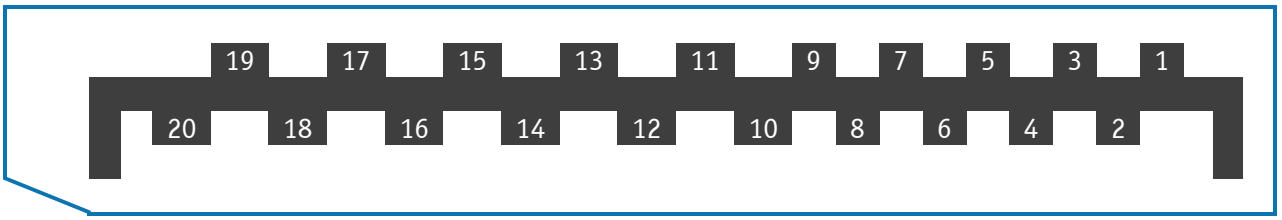
Column name	Description
Pin	Shows the pin-numbers in the connector. The graphical layout of the connector definition tables is made similar to the physical connectors.
Signal	The mnemonic name of the signal at the current pin. The notation "XX#" states that the signal "XX" is active low.
Type	AI: Analogue Input. AO: Analogue Output. I: Input, TTL compatible if nothing else stated. IO: Input / Output. TTL compatible if nothing else stated. IOT: Bi-directional tristate IO pin. IS: Schmitt-trigger input, TTL compatible. IOC: Input / open-collector Output, TTL compatible. IOD: Input / Output, CMOS level Schmitt-triggered. (Open drain output) NC: Pin not connected. O: Output, TTL compatible. OC: Output, open-collector or open-drain, TTL compatible. OT: Output with tri-state capability, TTL compatible. LVDS: Low Voltage Differential Signal. PWR: Power supply or ground reference pins.
	Ioh: Typical current in mA flowing out of an output pin through a grounded load, while the output voltage is > 2.4 V DC (if nothing else stated). Iol: Typical current in mA flowing into an output pin from a VCC connected load, while the output voltage is < 0.4 V DC (if nothing else stated).
Pull U/D	On-board pull-up or pull-down resistors on input pins or open-collector output pins.
Note	Special remarks concerning the signal.

The abbreviation *TBD* is used for specifications which are not available yet or which are not sufficiently specified by the component vendors.

6 IO-Area Connectors

6.1 DP Connectors DP1, DP2, DP3 (J24, J22, J23)

The DP (DisplayPort) connectors are based on standard DP type Foxconn 3VD51203-H7JJ-7H or similar.



Pin	Signal	Description	Type	Note
1	Lane 0 (p)		LVDS	
2	GND		PWR	
3	Lane 0 (n)		LVDS	
4	Lane 1 (p)		LVDS	
5	GND		PWR	
6	Lane 1 (n)		LVDS	
7	Lane 2 (p)		LVDS	
8	GND		PWR	
9	Lane 2 (n)		LVDS	
10	Lane 3 (p)		LVDS	
11	GND		PWR	
12	Lane 3 (n)		LVDS	
13	Config1	Aux or DDC selection	I	Internally pull down (1Mohm). Aux channel on pin 15/17 selected as default (when NC) DDC channel on pin 15/17, If HDMI adapter used (3.3V)
14	Config2	(Not used)	O	Internally connected to GND
15	Aux Ch (p)	Aux Channel (+) or DDC Clk		AUX (+) channel used by DP DDC Clk used by HDMI
16	GND		PWR	
17	Aux Ch (n)	Aux Channel (-) or DDC Data		AUX (-) channel used by DP DDC Data used by HDMI
18	Hot Plug		I	Internally pull down (100Kohm).
19	Return		PWR	Same as GND
20	3.3V		PWR	Fused by 1.5A resetable PTC fuse.

6.2 Ethernet Connectors

The KTQM87 supports two channels of 10/100/1000Mb Ethernet, one (LAN1) is based on Intel® Clarkville i218LM Gigabit PHY with AMT 9.0 support and one other controller (LAN2) are based on Intel® Pearsonville i218AT PCI Express controller.

In order to achieve the specified performance of the Ethernet port, Category 5 twisted pair cables must be used with 10/100MB and Category 5E, 6 or 6E with 1Gb LAN networks.

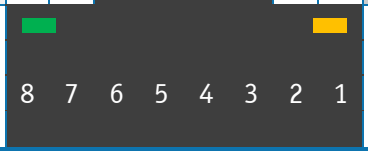
The signals for the Ethernet ports are as follows:

Signal	Description
MDI[0]+ / MDI[0]-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
MDI[1]+ / MDI[1]-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
MDI[2]+ / MDI[2]-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
MDI[3]+ / MDI[3]-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair. In MDI crossover mode, this pair acts as the BI_DC+/- pair.

Note: MDI = Media Dependent Interface.

Ethernet LAN1 (connector J9) is mounted together with USB Ports 10 and 11.
Ethernet LAN2 (connector J10) is mounted together with USB Ports 4 and 5.

The pinout of the RJ45 connectors is as follows:

Signal	PIN	Type	Ioh/Iol	Note
MDI0+				
MDI0-				
MDI1+				
MDI2+				
MDI2-				
MDI1-				
MDI3+				
MDI3-				
Flashing => communication		On => 1GB link		

6.3 USB Connectors (IO Area)

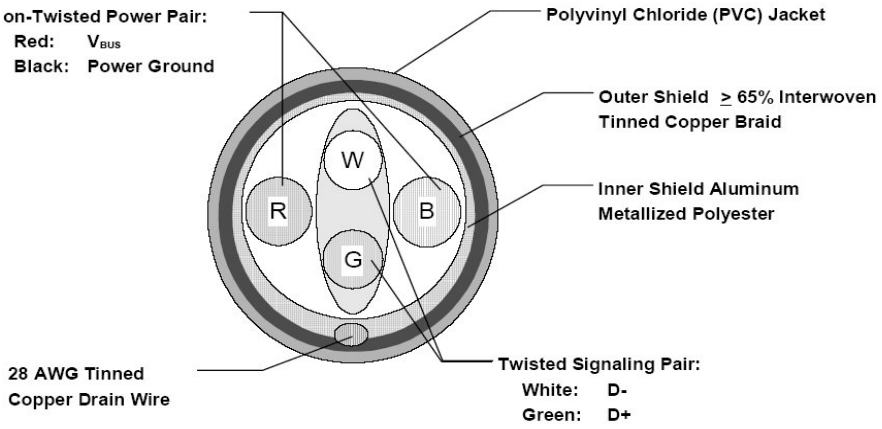
The KTQM87 board contains a EHCI (Enhanced Host Controller Interface) and a XHCI (Extensible Host Controller Interface). The EHCI controller supports eight USB 2.0 ports allowing data transfers up to 480Mb/s. The XHCI controller supports up to six USB 3.0 ports allowing data transfers up to 5Gb/s. Four of the USB 3.0 ports are shared with four of the USB 2.0 ports (USB0 – USB3).

Note: Not all USB 2.0 and USB 3.0 ports are physically connected to the board.

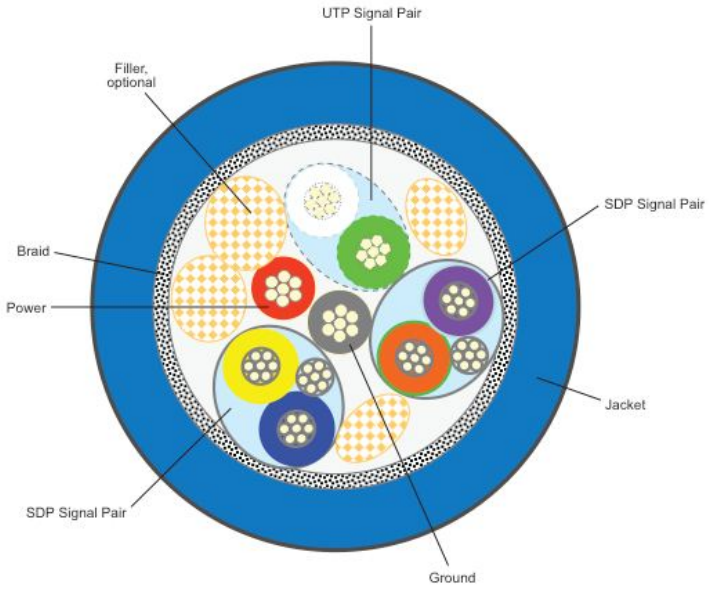
Legacy Keyboard/Mouse and wakeup from sleep states are supported. Over-current detection on all USB ports is supported. The following USB connectors are available in the IO Area.

USB 2.0/3.0 Port 0, 1, 2 & 3 are supplied on the combined quad USB connector (J35).
USB 2.0 Port 4, 5 are supplied on the combined 2xUSB and LAN connector (J10).
USB 2.0 Port 10, 11 are supplied on the combined 2xUSB and LAN connector (J9).

For USB2.0 cabling it is required to use only HiSpeed USB cable, specified in USB2.0 standard:



For USB3.0 cabling it is required to use only HiSpeed USB cable, specified in USB3.0 standard:



USB Connector J35 (USB0, 1, 2 & 3)

The quad USB connector J35, Ports 0, 1, 2 and 3 supports USB3.0/USB2.0.

Note	Type	Signal	PIN	Signal	Type	Note
	IO		USB3- USB3+		IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	RX2-	5 6 7 8 9	TX2+	IO	
	IO		RX1+ TX1-		IO	
	PWR		GND			
	IO		USB2- USB2+		IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	RX2-	5 6 7 8 9	TX2+	IO	
	IO		RX2+ TX2-		IO	
	PWR		GND			
	IO		USB1- USB1+		IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	RX1-	5 6 7 8 9	TX1+	IO	
	IO		RX1+ TX1-		IO	
	PWR		GND			
	IO		USB0- USB0+		IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	RX0-	5 6 7 8 9	TX0+	IO	
	IO		RX0+ TX0-		IO	
	PWR		GND			

Signal	Description
USBn+ USBn- RXn+ RXn- TXn+ TXn- (n= 0,1,2,3)	Differential pair works as serial differential receive/transmit data lines.
5V/SB5V	5V supply for external devices. SB5V is supplied during power-down to allow wakeup on USB device activity. Protected by resettable 2A fuse covering both USB ports.

USB 10 & 11 (J9)

The USB ports 10 and 11 supports USB2.0, are located in the stacked rear IO connectors J9 with LAN1.

Note	Type	Signal	PIN				Signal	Type	Note
	IO		USB10-		USB10+			IO	
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	PWR		GND						
	IO		USB11-		USB11+			IO	
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	PWR		GND						

Signal	Description
USB10+ USB10- USB11+ USB11-	Differential pair works as serial differential receive/transmit data lines.
5V/SB5V	5V supply for external devices. SB5V is supplied during power-down to allow wakeup on USB device activity. Protected by resettable 2A fuse covering both USB ports.

USB 4&5 (J10)

The USB ports 4 and 5 supports USB2.0, are located in the stacked rear IO connectors J10 with LAN2.

Note	Type	Signal	PIN				Signal	Type	Note
	IO		USB4-		USB4+			IO	
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	PWR		GND						
	IO		USB5-		USB5+			IO	
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	PWR		GND						

Signal	Description
USB4+ USB4- USB5+ USB5-	Differential pair works as serial differential receive/transmit data lines.
5V/SB5V	5V supply for external devices. SB5V is supplied during power-down to allow wakeup on USB device activity. Protected by resettable 2A fuse covering both USB ports.

6.4 Audio Jack Connector Stack (J16)

The on-board Audio circuit implements up to 8 Channel High Definition Audio via SPDIF-Out connector, see SPDIF-Out (J33) description.

Interface is based on UAA (Universal Audio Architecture), featuring five 24-bit stereo DACs and three 20-bit stereo ADCs. The Following Audio connector is available in IO Area.

Audio Speakers, Line-in and Microphone are available in a stacked audiojack connector:

	Signal	Type	Note
TIP	LINE1-IN-L	IA	1.0$V_{RMS,}$ 30kΩ
RING	LINE1-IN-R	IA	1.0V_{RMS}, 30kΩ
SLEEVE	GND	PWR	
TIP	OUT-L	OA	For headphone, max 1.6V_{RMS}
RING	OUT-R	OA	For headphone, max 1.6V_{RMS}
SLEEVE	GND	PWR	
TIP	MIC1-L	IA	1.0$V_{RMS,}$ 30kΩ
RING	MIC1-R	IA	1.0V_{RMS}, 30kΩ
SLEEVE	GND	PWR	

Signal	Description	Note
LINE1-IN-L	Line In signal Left	
LINE1-IN-R	Line In signal Right	
OUT-L	Speaker Out Left	Shared with J34 pin header connector
OUT-R	Speaker Out Right	Shared with J34 pin header connector
MIC1-L	Microphone In Left	
MIC1-R	Microphone In Right	

7 Internal Connectors

7.1 Power Connector (ATX+12V-24p) (J20)

The KTQM87 boards are designed to be supplied from a standard ATX (or BTX) power supply. Use of BTX supply is not required for operation, but may be required to drive high-power PCIe cards.

ATX+12V-24p Power Connector:

Note	Type	Signal	PIN		Signal	Type	Note
	PWR	3V3	12	24	GND	PWR	
	PWR	+12V	11	23	5V	PWR	
	PWR	+12V	10	22	5V	PWR	
	PWR	SB5V	9	21	5V	PWR	
	I	P_OK	8	20	-5V	PWR	1
	PWR	GND	7	19	GND	PWR	
	PWR	5V	6	18	GND	PWR	
	PWR	GND	5	17	GND	PWR	
	PWR	5V	4	16	PSON#	OC	
	PWR	GND	3	15	GND	PWR	
	PWR	3V3	2	14	-12V	PWR	
	PWR	3V3	1	13	3V3	PWR	

See chapter “Power Consumption” regarding input tolerances on 3.3V, 5V, SB5V, +12 and -12V (also refer to ATX specification version 2.2).

ATX+12V-4p Power Connector (J21):

Note	Type	Signal	PIN		Signal	Type	Note
	PWR	GND	2	4	+12V	PWR	1
	PWR	GND	1	3	+12V	PWR	1

Note 1: Use of the ATX+12V-4p in Power Connector is required for operation of KTQM87.

Signal	Description
P_OK	P_OK is power good signal driven by the ATX Power Supply and indicating that the +5VDC and +3.3VDC outputs are above the undervoltage thresholds. The recommended electrical and timing characteristics of the P_OK (PWR_OK) signal are provided in the *ATX12V Power SupplyDesign Guide*. It is strongly recommended to use an ATX or BTX supply, in order to provide supervision of the 5V and 3V3 supplies. These supplies are not supervised on-board.
PS_ON#	Active low open drain signal from the board to the power supply to turn on the power supply outputs. Signal must be pulled high by the power supply.

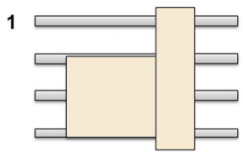
Warning: Hot plugging any of the two power connectors (J20 and J21) is not allowed. Hot plugging might damage the board. In other words, turn off main supply etc. to makesure all the power lines (+12V, 5V, SB5V, 3.3V, -5V, -12V) are turned off when connecting to the motherboard.

7.2 Fan Connectors (J28 and J29)

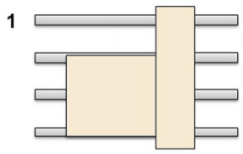
The FAN1SYS (J28) can be used to power, control and monitor a fan for chassis ventilation etc.
The FANCPU (J29) is used for the connection of the FAN for the CPU.

The 4pin header is recommended to be used for driving 4-wire type Fan in order to implement FAN speed control. 3-wire Fan support is also possible, but no fan speed control is integrated.

4-pin Mode:

Header	Pin	Signal	Description	Type
	1	PWM	PWM output	0-3.3
	2	TACHO	Tacho signal	I
	3	12V	Power +12V	PWR
	4	GND	Ground	PWR

3-pin Mode:

Header	Pin	Signal	Description	Type
	1		Not used	
	2	TACHO	Tacho signal	I
	3	12V	Power +12V	PWR
	4	GND	Ground	PWR

Signal	Description
PWM	PWM output signal for FAN speed control.
TACHO	Tacho input signal from the fan, for rotation speed supervision RPM (Rotation Per Minute). The signal shall be generated by an open collector transistor or similar. Onboard is a pull-up resistor 4K7 to +12V. The signal has to be pulsed and onboard circuit is prepared for two pulses per rotation.
12V	+12V supply for fan. A maximum of 2000mA can be supplied from this pin.
GND	Power Supply GND signal

7.3 PS/2 Keyboard and Mouse connector (KBDMSE) (J26)

Attachment of a PS/2 keyboard/mouse can be done through the pinrow connector KBDMSE (J26). Both interfaces utilize open-drain signalling with on-board pull-up.

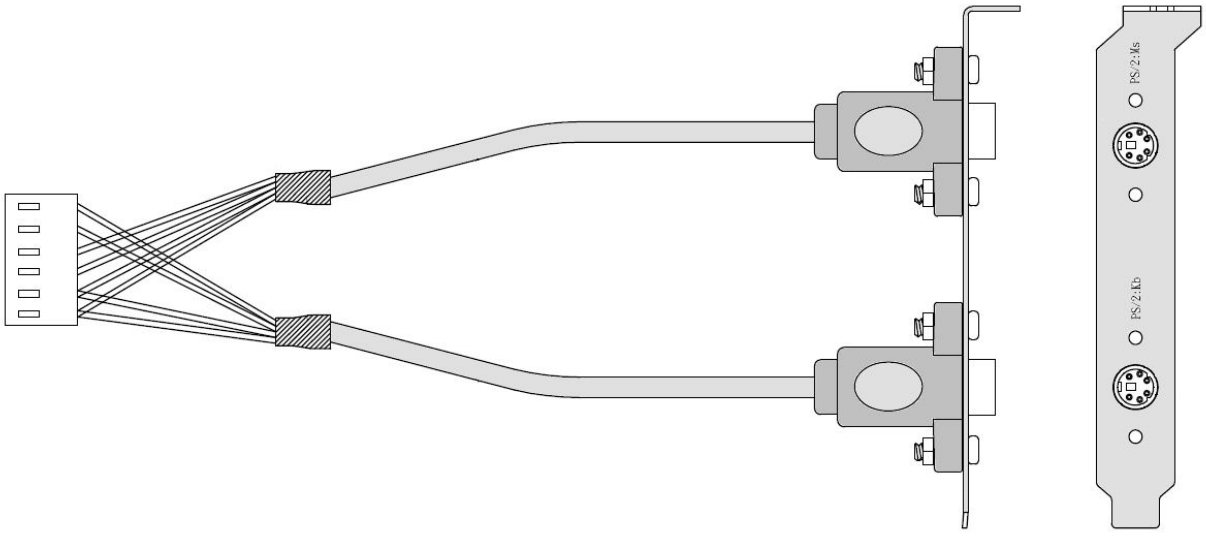
The PS/2 mouse and keyboard is supplied from SB5V when in standby mode in order to enable keyboard or mouse activity to bring the system out from power saving states. The supply is provided through a 1.1A resettable fuse.

PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
1	KBDCLK	IOD	/14mA	2K7	
2	KBDDAT	IOD	/14mA	2K7	
3	MSCLK	IOD	/14mA	2K7	
4	MSDAT	IOD	/14mA	2K7	
5	5V/SB5V	PWR	-	-	
6	GND	PWR	-	-	

Signal Description – Keyboard & and mouse Connector (KBDMSE).

Signal	Description
MSCLK	Bi-directional clock signal used to strobe data/commands from/to the PS/2 mouse.
MSDAT	Bi-directional serial data line used to transfer data from or commands to the PS/2 mouse.
KDBCLK	Bi-directional clock signal used to strobe data/commands from/to the PC-AT keyboard.
KBDDAT	Bi-directional serial data line used to transfer data from or commands to the PC-AT keyboard.

Available cable kit:



PN 1053-2384 Bracket Cable 6-Pin to PS2-Kbd-Mse

7.4 SATA (Serial ATA) Disk interface

The KTQM87 has an integrated SATA Host controller (PCH in the QM87 chipset) that supports independent DMA operation on six ports. One device can be installed on each port for a maximum of six SATA devices via four SATA connectors and two mSATA connector. A point-to-point interface (SATA cable) is used for host to device connections. Data transfer rates of up to 6.0/3.0/1.5Gb/s are supported on all SATA ports.

Note: Before installing OS on a SATA drive make sure the drive is not a former member of a RAID system. If so some hidden data on the disk has to be erased. To do this, connect two SATA drives and select RAID in BIOS. Save settings and select <Ctrl> <I> while booting to enter the RAID setup menu. Now the hidden RAID data will be erased from the selected SATA drive.

Supported SATA features:

- 2 to 4-drive RAID 0 (data striping)
- 2-drive RAID 1 (data mirroring)
- 3 to 4-drive RAID 5 (block-level striping with parity).
- 4-drive RAID 10 (data striping and mirroring)
- 2 to 4-drive matrix RAID, different parts of a single drive can be assigned to different RAID devices.
- AHCI (Advanced Host Controller Interface)
- NCQ (Native Command Queuing). NCQ is for faster data access.
- Swap bay support (not supported on mSATA)
- Intel® Rapid Recover Technology
- 2 – 256TB volume (Data volumes only)
- Capacity expansion
- TRIM in Windows 7 (in AHCI and RAID mode for drives not part of a RAID volume). (TRIM is for SSD data garbage handling).

SATA0, SATA1, SATA2 and SATA3 connector pinning:

PIN	Signal	Type	Ioh/Iol	Note
1	GND	PWR	-	
2	SATA* TX+			
3	SATA* TX-			
4	GND	PWR	-	
5	SATA* RX-			
6	SATA* RX+			
7	GND	PWR	-	

Signal	Description
SATA* RX+ / RX-	Host transmitter differential signal pair
SATA* TX+ / TX-	Host receiver differential signal pair

"*" specifies 0, 2, 3, 4, 5 depending on SATA port.

Available cable kit:

PN 821035 Cable SATA 500mm

7.5 USB Connectors (internal)

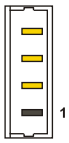
The following USB2.0 ports are available on Internal Pinrows:

USB2.0 Port 8 and 9 are supplied on the internal FRONTPNL connector (J12).
See “Front Panel Header” description.

USB2.0 Port 12 and 13 are supplied on the internal mPCIe connectors (J14 and J13) witch have included mSATA and USB connections. See “PCIe Connectors” description.

7.6 Speaker connector (J34)

The headphone interface is available through the connector J34 (4 pins). These outputs are shared with the Speaker Audio Jack connector (green).
Up to 100 dB Signal-to-Noise Ratio (SNR).

Header	Pin	Signal	Type
	4	HPOUT-R	AO
	3	GND	PWR
	2	HPOUT-L	AO
	1	GND	PWR

7.7 SPDIF-Out (J33)

The digital audio interface (electrical SPDIF-Out) is available through the 2 pin connector J33 and can be used to implement 8 (7.1) Channel High Definition Audio.

Circuit is based on high fidelity 8-channel HD audio codec which is compatible with Intel HD Audio specification and supports stereo 24-bit resolution and up to 192 kHz sample rate for DACs/ADCs.
Up to 90 dB Signal-to-Noise Ratio (SNR).

16/20/24-bit S/PDIF TX Outputs supporting 48K/96K/44.1K/88.2 KHz sample rate

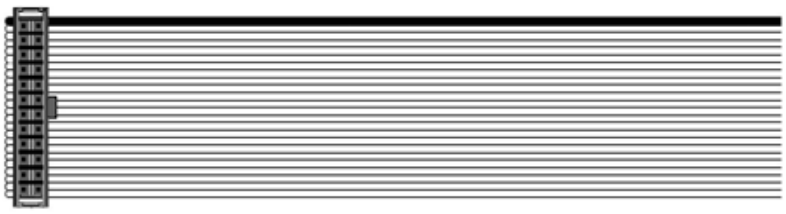
Header	Pin	Signal	Type
	2	GND	PWR
	1	SPDIF_OUT	O-3.3

7.8 Front Panel Connector (FRONTPNL) (J12)

Note	Pull U/D	Ioh/ Iol	Type	Signal	PIN	Signal	Type	Ioh/ Iol	Pull U/D	Note
	-	-	PWR	USB8_5V	1 2	USB9_5V	PWR	-	-	
	-	-		USB8-	3 4	USB9-		-	-	
	-	-		USB8+	5 6	USB9+		-	-	
	-	-	PWR	GND	7 8	GND	PWR	-	-	
	-	-	NC	NC	9 10	LINE2-L		-	-	
	-	-	PWR	+5V	11 12	+5V	PWR	-	-	
	-	25/25mA	O	SATA_LED#	13 14	SUS_LED	O	7mA	-	
	-	-	PWR	GND	15 16	PWRBTN_IN#	I		1K1	
	4K7	-	I	RSTIN#	17 18	GND	PWR	-	-	
	-	-	PWR	SB3V3	19 20	LINE2-R		-	-	
	-	-	PWR	AGND	21 22	AGND	PWR	-	-	
	-	-	AI	MIC2-L	23 24	MIC2-R	AI	-	-	

Signal	Description
USB8_5V & USB9_5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by active power switch 1A fuse for each USB ports.
USB8+/USB8-	Universal Serial Bus Port 8 Differentials: Bus Data/Address/Command Bus.
USB9+/USB9-	Universal Serial Bus Port 11 Differentials: Bus Data/Address/Command Bus.
+5V	Maximum load per pin is 1A (using IDC connector) or 2A (using crimp terminals).
SATA_LED#	SATA Activity LED (active low signal). 3V3 output when passive.
SUS_LED	Suspend Mode LED (active high signal). Output 3.3V via 470Ω.
PWRBTN_IN#	Power Button In. Toggle this signal low to start the ATX / BTX PSU and boot the board.
RSTIN#	Reset Input. When pulled low for a minimum 16ms, the reset process will be initiated. The reset process continues even though the Reset Input is kept low.
LINE2	Line2 is second stereo Line signals
MIC2	MIC2 is second stereo microphone input.
SB3V3	Standby 3.3V voltage
AGND	Analogue Ground for Audio

Available cable kit:



PN 821042 Cable Front Panel Open-End, 300 mm

7.9 Serial COM1 – COM2 Ports (J19, J18)

Two RS232 serial ports are available on the KTQM87.
The typical definition of the signals in the COM ports is as follows:

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates to the modem etc. that the on-board UART is ready to establish a communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect, indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.

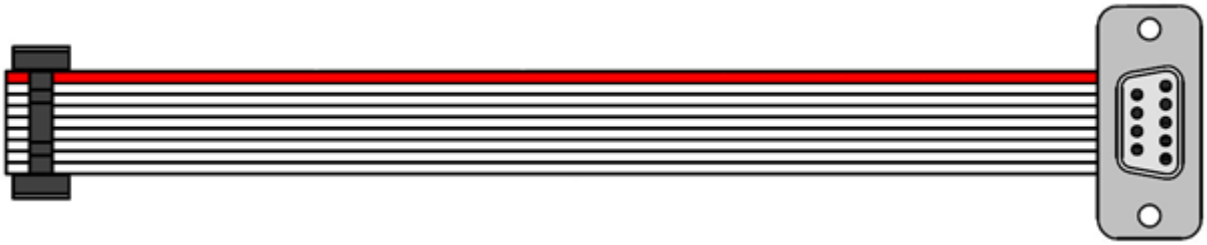
The pinout of Serial ports COM1 (J19), COM2 (J18)

Note	Ioh/Iol	Type	Signal	PIN	Signal	Type	Ioh/Iol	Note
	-	I	DCD	1 2	DSR	I	-	
	-	I	RxD	3 4	RTS	O		
		O	TxD	5 6	CTS	I	-	
		O	DTR	7 8	RI	I	-	
	-	PWR	GND	9 10	5V	PWR	-	1

Note 1: The COM1, COM2 5V supply is fused with common 1.5A resettable fuse.

DB9 adapter cables (PN 821016 200mm long and 821017 100mm long) are available for implementing standard COM ports on chassis.

Available cable kit (DB9 adapter cables):



PN 821017 - 100 mm or PN 821016 - 200 mm

7.10 LVDS Flat Panel Connector (J31)

The LVDS connector is based on 40 pole connector type Don Connex C44-40BSB1-G.

Note	Type	Signal	PIN		Signal	Type	Note
Max. 0.5A	PWR	+12V	1	2	+12V	PWR	Max. 0.5A
Max. 0.5A	PWR	+12V	3	4	+12V	PWR	Max. 0.5A
Max. 0.5A	PWR	+12V	5	6	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	+5V	7	8	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	LCDVCC	9	10	LCDVCC	PWR	Max. 0.5A
2K2Ω, 3.3V	OT	DDC CLK	11	12	DDC DATA	OT	2K2Ω, 3.3V
3.3V level	OT	BKLTCTL	13	14	VDD ENABLE	OT	3.3V level
3.3V level	OT	BKLTEN#	15	16	GND	PWR	Max. 0.5A
	LVDS	LVDS A0-	17	18	LVDS A0+	LVDS	
	LVDS	LVDS A1-	19	20	LVDS A1+	LVDS	
	LVDS	LVDS A2-	21	22	LVDS A2+	LVDS	
	LVDS	LVDS ACLK-	23	24	LVDS ACLK+	LVDS	
	LVDS	LVDS A3-	25	26	LVDS A3+	LVDS	
Max. 0.5A	PWR	GND	27	28	GND	PWR	Max. 0.5A
	LVDS	LVDS B0-	29	30	LVDS B0+	LVDS	
	LVDS	LVDS B1-	31	32	LVDS B1+	LVDS	
	LVDS	LVDS B2-	33	34	LVDS B2+	LVDS	
	LVDS	LVDS BCLK-	35	36	LVDS BCLK+	LVDS	
	LVDS	LVDS B3-	37	38	LVDS B3+	LVDS	
Max. 0.5A	PWR	GND	39	40	GND	PWR	Max. 0.5A

Note: The KTQM87 on-board LVDS connector supports single and dual channel, 18/24bit SPWG panels up to a resolution of 1600x1200 or 1920x1080 and with limited frame rate up to 1920x1200.

Signal Description – LVDS Flat Panel Connector:

Signal	Description
LVDS A0..A3	LVDS A Channel data
LVDS ACLK	LVDS A Channel clock
LVDS B0..B3	LVDS B Channel data
LVDS BCLK	LVDS B Channel clock
BKLTCTL	Backlight control (1), PWM signal to implement voltage in the range 0-3.3V
BKLTEN#	Backlight Enable signal (active low) (2)
VDD ENABLE	Output Display Enable.
LCDVCC	VCC supply to the display. 5V or 3.3V (1A Max.) selected in BIOS setup menu. Power sequencing depends on LVDS panel selection. (Shared with eDP connector)
DDC CLK	DDC Channel Clock

Notes: Windows API will be available to operate the BKLTCTL signal. Some Inverters have a limited voltage range 0- 2.5V for this signal: If voltage is > 2.5V the Inverter might latch up. Some Inverters generates noise on the BKLTCTL signal, causing the LVDS transmission to fail (corrupted picture on the display). By adding a 1Kohm resistor in series with this signal, mounted at the Inverter end of the cable kit, the noise is limited and the picture is stable.
If the Backlight Enable is required to be active high then, check the following BIOS Chipset setting: Backlight Signal Inversion = Enabled.

7.11 Feature Connector (J27)

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
2	2M/	-	I	CASE_OPEN#	1	2	SMBC		/4mA	10K/	1
	-	25/25mA	O	S5#	3	4	SMBD		/4mA	10K/	1
	-	25/25mA	O	PWR_OK	5	6	EXT_BAT	PWR	-	-	
	-		NC	-	7	8	-	NC	-	-	
	-	-	PWR	SB3V3	9	10	SB5V	PWR	-	-	
	-		IOT	GPIO0	11	12	GPIO1	IOT		-	
	-		IOT	GPIO2	13	14	GPIO3	IOT		-	
	-		IOT	GPIO4	15	16	GPIO5	IOT		-	
	-		IOT	GPIO6	17	18	GPIO7	IOT		-	
	-	-	PWR	GND	19	20	GND	PWR	-	-	
	-		I	GPIO8	21	22	GPIO9	I		-	
	-		I	GPIO10	23	24	GPIO11	I		-	
	-		I	GPIO12	25	26	GPIO13	IOT		-	
	-		IOT	GPIO14	27	28	GPIO15	IOT		-	
	-		IOT	GPIO16	29	30	GPIO17	IOT		-	
	-	-	PWR	GND	31	32	GND	PWR	-	-	
	-	8/8mA	O	EGCLK	33	34	EGCS#	O	8/8mA	-	
	-	8/8mA		EGAD	35	36	TMA0	O			
	-		PWR	+12V	37	38	GND	PWR	-	-	
	-		NC	-	39	40	-	NC	-	-	
	-	-	PWR	GND	41	42	GND	PWR	-	-	
	-	-	PWR	GND	43	44	S3#	O	25/25mA	-	

Notes: 1. Pull-up to +3V3Dual (+3V3 or SB3V3). **2**. Pull-up to on-board Battery. **3**. Pull-up to +3V3.

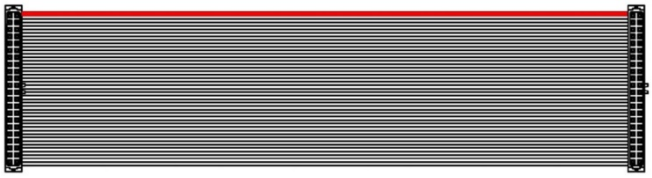
Signal	Description
CASE_OPEN#	CASE OPEN, used to detect if the system case has been opened. This signal's status is readable, so it may be used like a GPI when the Intruder switch is not required.
SMBC	SMBus Clock signal
SMBD	SMBus Data signal
S3#	S3 sleep mode, active low output, optionally used to deactivate external system.
S5#	S5 sleep mode, active low output, optionally used to deactivate external system.
PWR_OK	PoWeR OK, signal is high if no power failures are detected. (This is not the same as the P_OK signal generated by ATX PSU).
EXT_BAT	(EXTernal BATtery) option for connecting + terminal of an external primary cell battery (2.5 - 3.47 V) (– terminal connected to GND). The external battery is protected against charging and can be used with/without the on-board battery installed.
SB3V3	Max. load is 0.75A (1.5A < 1 sec.)
SB5V	StandBy +5V supply.

Signal	Description
GPIO0..17	General Purpose Inputs / Output. These Signals may be controlled or monitored through the use of the KT-API-V2 (Application Programming Interface).
EGCLK	Extend GPIO Clock signal
EGAD	Extend GPIO Address Data signal
EGCS#	Extend GPIO Chip Select signal, active low
TMA0	Timer Output
+12V	Max. load is 0.75A (1.5A < 1 sec.)

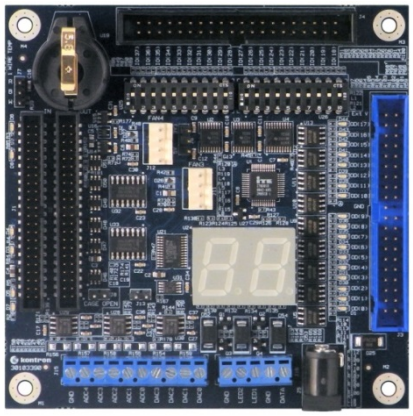
The GPIO's are controlled via the ITE IT8516F Embedded Controller. Each GPIO has 100pF to ground, clamping Diode to 3V3 and has multiplexed functionality. Some pins can be DAC (Digital to Analogue Converter output), PWM (Pulse Width Modulated signal output), ADC (Analogue to Digital Converter input), TMRI (Timer Counter Input), WUI (Wake Up Input), RI (Ring Indicator Input) or some special function.

Signal	IT8516F pin name	Type	Description
GPIO0	DAC0/GPJ0	AO/IOS	
GPIO1	DAC1/GPJ1	AO/IOS	
GPIO2	DAC2/GPJ2	AO/IOS	
GPIO3	DAC3/GPJ3	AO/IOS	
GPIO4	PWM2/GPA2	O8/IOS	
GPIO5	PWM3/GPA3	O8/IOS	
GPIO6	PWM4/GPA4	O8/IOS	
GPIO7	PWM5/GPA5	O8/IOS	
GPIO8	ADC0/GPI0	AI/IS	
GPIO9	ADC1/GPI1	AI/IS	
GPIO10	ADC2/GPI2	AI/IS	
GPIO11	ADC3/GPI3	AI/IS	
GPIO12	ADC4/WUI28/GPI4	AI/IS/IS	
GPIO13	RI1#/WUI0/GPD0	IS/IS/IOS	
GPIO14	RI2#/WUI1/GPD1	IS/IS/IOS	
GPIO15	TMRI0/WUI2/GPC4	IS/IS/IOS	
GPIO16	TMRI1/WUI3/GPC6	IS/IS/IOS	
GPIO17	L80HLAT/BA0/WUI24/GPE0	O4/O4/IS/IOS	

Available cable kit and Break-Out-Board:



PN 1052-5885 Cable, Feature 44pol 1 to1, 300mm



PN 820978 Feature BOB (Break-Out-Board)

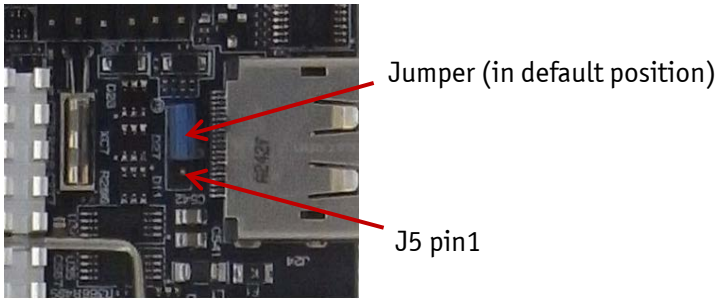
7.12 "Load Default BIOS Settings" Jumper (J5)

The "Load Default BIOS Settings" Jumper (J5) can be used to recover from incorrect BIOS settings. As an example, an incorrect BIOS setting which causes the attached display not to turn on can be erased by this Jumper.

The Jumper has 3 positions: Pin 1-2, Pin2-3 (default position) and not mounted.

Warning

Don't leave the jumper in position 1-2, otherwise if power is disconnected, the battery will fully deplete within a few weeks.



J5		Description
pin1-2	pin2-3	
X	-	Don't use. (Board do not boot with jumper in this position)
-	X	Default position
-	-	Load Default BIOS Settings and erase Password

To Load Default BIOS Settings and erase password:

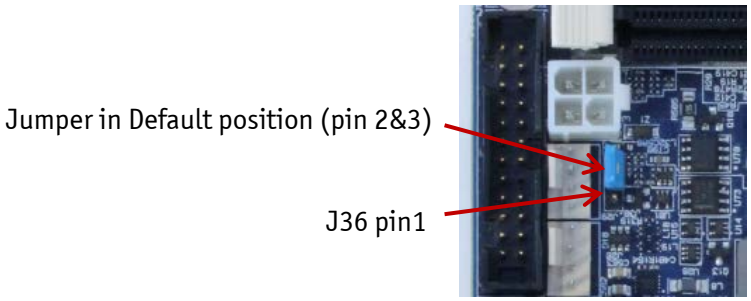
1. Turn off power completely (no SB5V).
2. Remove the Jumper completely from J5.
3. Turn on power.
4. Motherboard beeps fast 20 times and turns off.
5. Turn off power.
6. Move the Jumper back to position 2-3 (default position).
7. Turn on power, use the Power On Button (PWRBTN_IN#) if required to boot.

Motherboard might automatically reboot a few times. Wait until booting is completed.

7.13 Always On jumper setting (J36)

When jumper is installed in the (J36) Always On position, then the Board will automatically power up, when the external power supply is switched ON.

When jumper is in the (J36) Default position, or if jumper is not mounted, then Always On feature is disabled and it might be necessary to activate the power on buttom (PWRBTN_IN#) at the Front Panel connector (FRONTPNL) in order to switch on the board.



J36		Description
pin1-2	pin2-3	
X	-	Always On: Will make Auto power On when power in switched ON.
-	X	Default: Always On feature is disabled.
-	-	Same as Default.

7.14 SPI Connector (J32)

The SPI Connector is normally not used. If however a SPI BIOS is connected via the SPI Connector then the board will attempt to boot from it.

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
1	-			CLK	1	2	SB3V3	PWR	-	-	
	-		I	CS0#	3	4	ADDIN	IO		/10K	
	10K/		-	NC	5	6	NC	-	-	-	
	10K/		IO	MOSI	7	8	ISOLATE#	IO		100K	
	-		IO	MISO	9	10	GND	PWR	-	-	
	1K		IO	SPI_IO2_#WP	11	12	SPI_IO3_#HOLD	IO		1K	

Signal	Description
CLK	Serial Clock
SB3V3	3.3V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC.
MOSI	Master Output, Slave Input.
ISOLATE#	The ISOLATE# input, active low, is normally NC, but must be connected to GND when programming the SPI flash. Power Supply to the Motherboard must be turned off when loading SPI flash. The pull up resistor is connected via diode to 5VSB.
MISO	Master Input, Slave Output
SPI_IO2_#WP	SPI Data I/O: A bidirectional signal used to support Dual IO Fast Read, Quad IO Fast Read and Quad Output Fast Read modes. The signal is not used in Dual Output Fast Read mode.
SPI_IO3_#HOLD	SPI Data I/O: A bidirectional signal used to support Dual IO Fast Read, Quad IO Fast Read and Quad Output Fast Read modes. The signal is not used in Dual Output Fast Read mode.

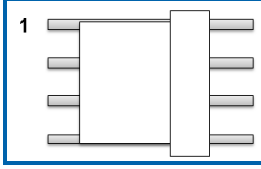
7.15 ccTalk Connector (J25)

The ccTalk interface uses a 4-pin connector identical to the Fan connectors.

Warning: Caution must be exercised to avoid inserting a CcTalk header into a FAN connector as this might result in damage to the CcTalk device, motherboard or both!

Serial protocol used in money transaction industry. Peripherals such as coin acceptors, bill validators, automatic payment equipment such as transportation, ticketing, payphones, amusement machines and retail cash management use ccTalk to talk to the host controller.

ccTalk transfer asynchronously at 4800 -9600 baud, character frames via single wire bidirectional communication at TTL level. It has 'multi-drop' support for devices all having unique addresses. It can easily expandable command interface and has some DES encryption. No licensing.

Header	Pin	Signal	Description	Type
	1	VCC5	Power +5V	PWR
	2	N.C.	Not connected	NC
	3	GND	Ground	PWR
	4	DATA	Serial data line (RXD/TXD)	IO

7.16 LPC Connector (J30)

The LPC connector is in general unsupported. Only under special circumstances may the LPC interface be of interest.

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
	-	-	PWR	LPC CLK	1	2	GND				
	-	-	PWR	LPC FRAME#	3		KEY				
				LPC RST#	5	6	+5V				
				LPC AD3	7	8	LPC AD2				
				+3V3	9	10	LPC AD1				
				LPC AD0	11	12	GND				
				SMB_CLK	13	14	SMB_DATA				
				SB3V3	15	16	LPC SERIRQ				
				GND	17	18	CLKRUN#				
				SUS_STAT#	19	20	TPM_DRQ#0				

8 Slot Connectors (PCIe, miniPCIe)

8.1 PCIe Connectors

KTQM87 supports 1 xPCIe x16 (16-lane) PCI Express port, 2 x miniPCI Express with different options, one miniPCI Express ports (J14) with mSATA,USB2.0 and SIM-card Socket (J15) one miniPCI Express port (J13) with mSATA and USB2.0. The PCIex16 slot supports PEG Bifurcation 2x PCIex8 or 1x PCIe x8 + 2x PCIe x4, but need Riser Card with bifurcation functionality to work.

The 16-lane (x16) PCI Express (J8) (PCIe 2.0 and PCIe 3.0) port can be used for external PCI Express cards inclusive graphics card. Maximum theoretical bandwidth using 16 lanes is 16 GB/s.

PCI-Express x16 Connector (J8 PCIe x16)

Note	Type	Signal	PIN		Signal	Type	Note
		+12V	B1	A1	NC		
		+12V	B2	A2	+12V		
		+12V	B3	A3	+12V		
		GND	B4	A4	GND		
		SMB_CLK	B5	A5	NC		
		SMB_DATA	B6	A6	NC		
		GND	B7	A7	NC		
		+3V3	B8	A8	NC		
		NC	B9	A9	+3V3		
		SB3V3	B10	A10	+3V3		
		WAKE#	B11	A11	RST#		
		NC	B12	A12	GND		
		GND	B13	A13	PCIE_x16 CLK		
		PEG_TXP[0]	B14	A14	PCIE_x16 CLK#		
		PEG_TXN[0]	B15	A15	GND		
		GND	B16	A16	PEG_RXP[0]		
		CLKREQ	B17	A17	PEG_RXN[0]		
		GND	B18	A18	GND		
		PEG_TXP[1]	B19	A19	NC		
		PEG_TXN[1]	B20	A20	GND		
		GND	B21	A21	PEG_RXP[1]		
		GND	B22	A22	PEG_RXN[1]		
		PEG_TXP[2]	B23	A23	GND		
		PEG_TXN[2]	B24	A24	GND		
		GND	B25	A25	PEG_RXP[2]		
		GND	B26	A26	PEG_RXN[2]		
		PEG_TXP[3]	B27	A27	GND		
		PEG_TXN[3]	B28	A28	GND		
		GND	B29	A29	PEG_RXP[3]		
		NC	B30	A30	PEG_RXN[3]		
		CLKREQ	B31	A31	GND		
		GND	B32	A32	NC		
		PEG_TXP[4]	B33	A33	NC		
		PEG_TXN[4]	B34	A34	GND		

		GND	B35	A35	PEG_RXP[4]		
		GND	B36	A36	PEG_RXN[4]		
		PEG_TXP[5]	B37	A37	GND		
		PEG_TXN[5]	B38	A38	GND		
		GND	B39	A39	PEG_RXP[5]		
		GND	B40	A40	PEG_RXN[5]		
		PEG_TXP[6]	B41	A41	GND		
		PEG_TXN[6]	B42	A42	GND		
		GND	B43	A43	PEG_RXP[6]		
		GND	B44	A44	PEG_RXN[6]		
		PEG_TXP[7]	B45	A45	GND		
		PEG_TXN[7]	B46	A46	GND		
		GND	B47	A47	PEG_RXP[7]		
		CLKREQ	B48	A48	PEG_RXN[7]		
		GND	B49	A49	GND		
		PEG_TXP[8]	B50	A50	NC		
		PEG_TXN[8]	B51	A51	GND		
		GND	B52	A52	PEG_RXP[8]		
		GND	B53	A53	PEG_RXN[8]		
		PEG_TXP[9]	B54	A54	GND		
		PEG_TXN[9]	B55	A55	GND		
		GND	B56	A56	PEG_RXP[9]		
		GND	B57	A57	PEG_RXN[9]		
		PEG_TXP[10]	B58	A58	GND		
		PEG_TXN[10]	B59	A59	GND		
		GND	B60	A60	PEG_RXP[10]		
		GND	B61	A61	PEG_RXN[10]		
		PEG_TXP[11]	B62	A62	GND		
		PEG_TXN[11]	B63	A63	GND		
		GND	B64	A64	PEG_RXP[11]		
		GND	B65	A65	PEG_RXN[11]		
		PEG_TXP[12]	B66	A66	GND		
		PEG_TXN[12]	B67	A67	GND		
		GND	B68	A68	PEG_RXP[12]		
		GND	B69	A69	PEG_RXN[12]		
		PEG_TXP[13]	B70	A70	GND		
		PEG_TXN[13]	B71	A71	GND		
		GND	B72	A72	PEG_RXP[13]		
		GND	B73	A73	PEG_RXN[13]		
		PEG_TXP[14]	B74	A74	GND		
		PEG_TXN[14]	B75	A75	GND		
		GND	B76	A76	PEG_RXP[14]		
		GND	B77	A77	PEG_RXN[14]		
		PEG_TXP[15]	B78	A78	GND		
		PEG_TXN[15]	B79	A79	GND		
		GND	B80	A80	PEG_RXP[15]		
		CLKREQ	B81	A81	PEG_RXN[15]		
		NC	B82	A82	GND		

MiniPCIe with mSATA/USB2.0 & SIM-card support (J14)

Slot J14 supports mPCIe or mSATA cards (uses SATA5 Port), USB2.0 and SIM-card socket (J15).
The SIM-card socket makes it possible to use a 2G/3G-wireless modem in this mPCIe slot.
The USB does support WAKE function.

Note	Type	Signal	PIN		Signal	Type	Note
		WAKE#	1	2	+3V3	PWR	
	NC	NC	3	4	GND	PWR	
	NC	NC	5	6	+1.5V	PWR	
1		CLKREQ#	7	8	UIM_PWR	PWR	
	PWR	GND	9	10	UIM_DATA	NC	
		PCIE_mini CLK#	11	12	UIM_CLK	NC	
		PCIE_mini CLK	13	14	UIM_RESET	NC	
	PWR	GND	15	16	UIM_VPP	NC	
	NC	UIM_IC_DM	17	18	GND	PWR	
	NC	UIM_IC_DP	19	20	W_Disable#		2
	PWR	GND	21	22	RST#		
		SATA5_RXP	23	24	+3V3	PWR	
		SATA5_RXN	25	26	GND	PWR	
	PWR	GND	27	28	+1.5V	PWR	
	PWR	GND	29	30	SMB_CLK		
		SATA5_TXN	31	32	SMB_DATA		
		SATA5_TXP	33	34	GND	PWR	
	PWR	GND	35	36	USB12N	IO	
	PWR	GND	37	38	USB12P	IO	
	PWR	+3V3	39	40	GND	PWR	
	PWR	+3V3	41	42	NC	NC	
		SATA_DET5#	43	44	NC	NC	
	NC	NC	45	46	NC	NC	
	NC	NC	47	48	+1.5V	PWR	
	NC	NC	49	50	GND	PWR	
	NC	NC	51	52	+3V3	PWR	

Note 1: 10K ohm pull-up to 3V3.
Note 2: 2K2 ohm pull-up to 3V3 Dual.

MiniPICe with mSATA & USB2.0 (J13)

Slot J13 supports mPCIe or mSATA cards (uses SATA5 Port) and USB2.0. The USB does support WAKE function.

Note	Type	Signal	PIN		Signal	Type	Note
		WAKE#	1	2	+3V3	PWR	
	NC	NC	3	4	GND	PWR	
	NC	NC	5	6	+1.5V	PWR	
1		CLKREQ#	7	8	NC	NC	
	PWR	GND	9	10	NC	NC	
		PCIE_mini CLK#	11	12	NC	NC	
		PCIE_mini CLK	13	14	NC	NC	
	PWR	GND	15	16	NC	NC	
		SUS_CLK	17	18	GND	PWR	
	NC	NC	19	20	W_Disable#		2
	PWR	GND	21	22	RST#		
		SATA4_RXP	23	24	+3V3	PWR	
		SATA4_RXN	25	26	GND	PWR	
	PWR	GND	27	28	+1.5V	PWR	
	PWR	GND	29	30	SMB_CLK		
		SATA4_TXN	31	32	SMB_DATA		
		SATA4_TXP	33	34	GND	PWR	
	PWR	GND	35	36	U_USB13N	IO	
	PWR	GND	37	38	U_USB13P	IO	
	PWR	+3V3	39	40	GND	PWR	
	PWR	+3V3	41	42	NC	NC	
		SATA_DET4#	43	44	NC	NC	
		CL_CLK	45	46	NC	NC	
		CL_DATA	47	48	+1.5V	PWR	
		CL_RSTB	49	50	GND	PWR	
		W_DISABLE_N	51	52	+3V3	PWR	

Note 1: 10K ohm pull-up to 3V3.
Note 2: 2K2 ohm pull-up to 3V3 Dual.

9 On-board -& mating connector types

The Mating connectors / Cables are connectors or cable kits which are fitting the On-board connector. The Kontron cable kits marked with "*" are included in the "KTQM87 Cable & Driver Kit" PN 826603.

Connector	On-board Connectors		Mating Connectors / Cables	
	Manufact.	Type no.	Manufact.	Type no.
FANCPU (J29) FANSYS (J28) ccTALK (J25)	Foxconn	HF2704E-M1	AMP	1375820-4 (4-pole)
	Foxconn	HF2704F-M2	AMP	1375820-3 (3-pole)
	AMP	1470947-1		
KBDMSE (J26)	Molex	22-23-2061	Molex	22-01-2065
	Tyco AMP	3-647050-6	Kontron	1046-3381 (kit) *
	Jaws	254K-WS-06T-S	Kontron	1053-2384 (kit)
LPC (J30)	Wieson	G2100C888-034H		
	Foxconn	HC11101-P0		
SATA0,1 (J3,J2)	Lotes	ABA-SAT-010-K08	Molex	67489-8005
			Kontron	821035 (kit)
SATA,2,3 (J1,J4)	Lotes	ABA-SAT-010-K07	Molex	67489-8005
	Molex	47155-4001	Kontron	821035 (kit) *
ATX+12V-24p (J20)	Molex	44206-0002	Molex	5557-24R
ATX+12V-4p (J21)	Lotes	ABA-POW-003-K02	Molex	39-01-2045
Speaker (J34)	Molex	53047-0410		
LVDS (J31)	Don Connex	C44-40BSB1-G	Don Connex	A32-40-C-G-B-1
	Samtec	SHF-120-01-FDSMKTR	Kontron	910000005
	Hon Kon	HB12-220-VFS-20R	Kontron	821515 (kit) *
	Wieson	G2124-03200101-00	Kontron	821155 (kit)
COM1,2 (J19,J18)	Pinrex	510-90-10GB00	Molex	90635-1103
	Cen Link	ZP91-014B1-10Y1	Kontron	821016 (kit)
	Foxconn	HL2205F	Kontron	821017 (kit) *
USB8/9 (*)	(FRONTPNL)	-	Kontron	821401 (kit)
SPI (J32)	Pinrex	210-92-06GB01		
SPDIF-out (J33)	Molex	53047-0210		
FRONTPNL (J12)	Pinrex	510-80-24GB05	Molex	90635-1243
	Foxconn	HL2112V-P9	Kontron	821042 (kit) *
FEATURE (J27)	Pinrex	52A-90-44GB00	Don Connex	A05c-44-B-G-A-1-G
	Molex	87831-4420	Kontron	1052-5885 (kit) *

* USB8/USB9 are located in FRONTPNL connector.

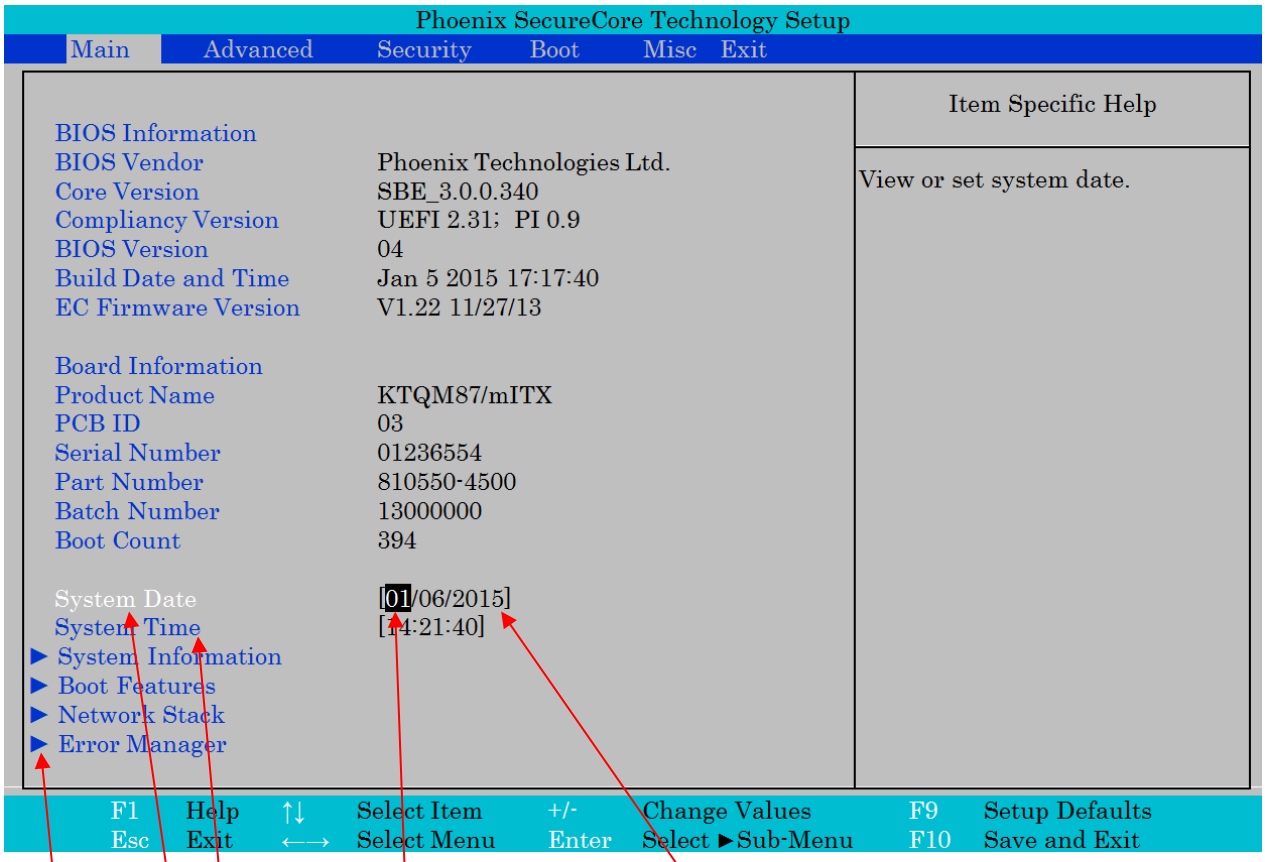
Note: More than one connector can be listed for each type of on-board connectors even though several types with same fit, form and function are approved and could be used as alternative. Please also notice that standard connectors like DP, PCIe, miniPCIe, Audio Jack, Ethernet and USB are not included in the list.

10 BIOS

The BIOS Setup is used to view and configure BIOS settings for the board. The BIOS Setup is accessed by pressing the <Del> -key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins.

The BIOS settings will be loaded automatically when loading "Restore Default" see "Save & Exit" menu. In this Users Guide the default settings are indicated by **bold**. Please notice that "Restore User Defaults" might have different set of default values.

10.1 Main

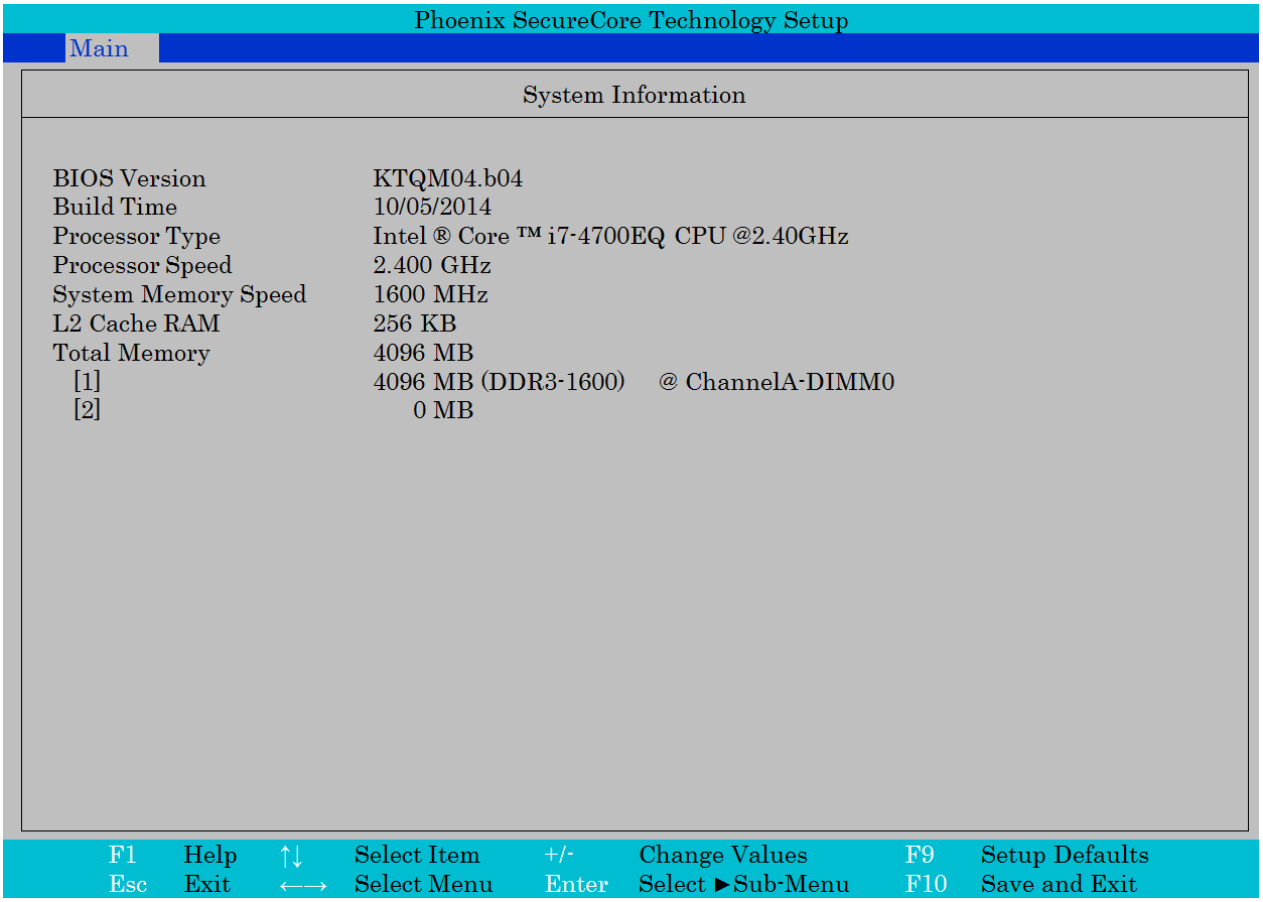

Phoenix SecureCore Technology Setup
Main Advanced Security Boot Misc Exit
Item Specific Help
View or set system date.
BIOS Information
BIOS Vendor Phoenix Technologies Ltd.
Core Version SBE_3.0.0.340
Compliancy Version UEFI 2.31; PI 0.9
BIOS Version 04
Build Date and Time Jan 5 2015 17:17:40
EC Firmware Version V1.22 11/27/13
Board Information
Product Name KTQM87/mITX
PCB ID 03
Serial Number 01236554
Part Number 810550-4500
Batch Number 13000000
Boot Count 394
System Date [01/06/2015]
System Time [14:21:40]
▶ System Information
▶ Boot Features
▶ Network Stack
▶ Error Manager
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Sub Menu available.
White text for actual selected function which can be modified.
Blue text for functions (not all can be modified).
Black background for actual selection. Black text actual settings.

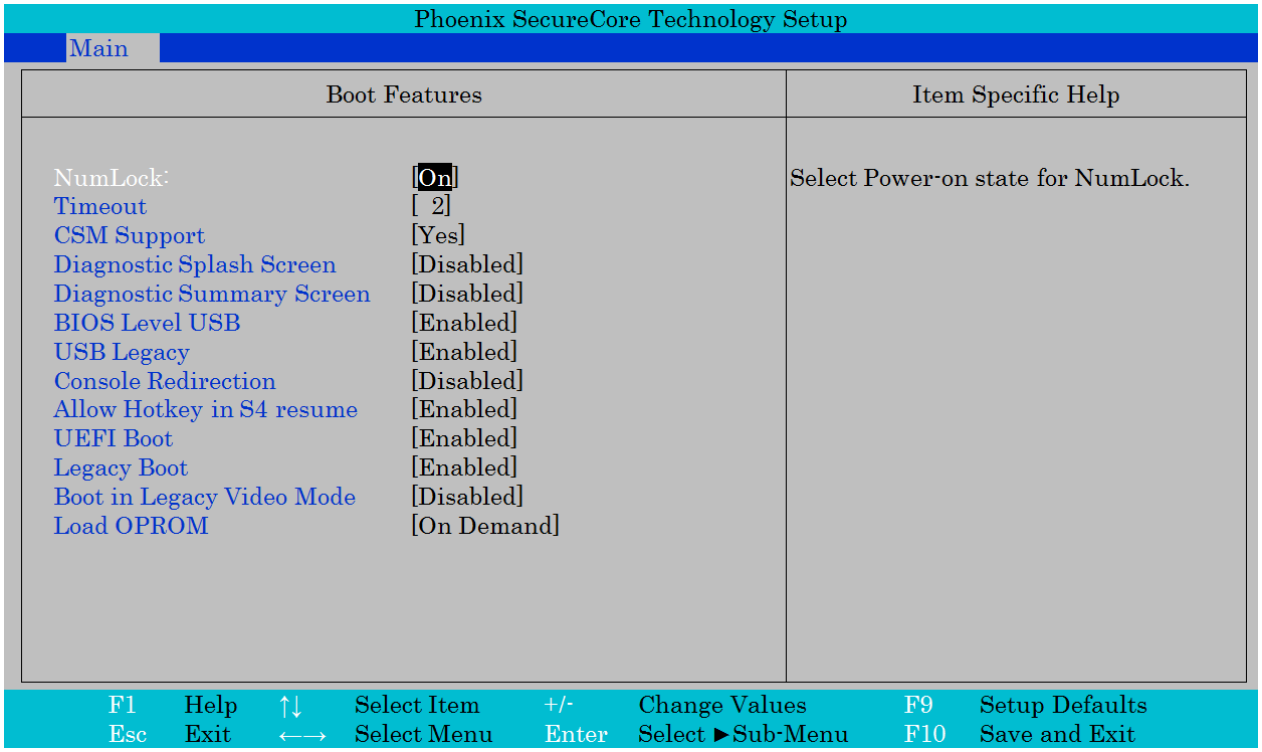
Feature	Options	Description
System Date	MM/DD/YYYY	Set the system date.
System Time	HH:MM:SS	Set the system time.

The following table describes the changeable settings:

System Information


Phoenix SecureCore Technology Setup
Main
System Information
BIOS Version KTQM04.b04
Build Time 10/05/2014
Processor Type Intel ® Core ™ i7-4700EQ CPU @2.40GHz
Processor Speed 2.400 GHz
System Memory Speed 1600 MHz
L2 Cache RAM 256 KB
Total Memory 4096 MB
[1] 4096 MB (DDR3-1600) @ ChannelA-DIMM0
[2] 0 MB
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

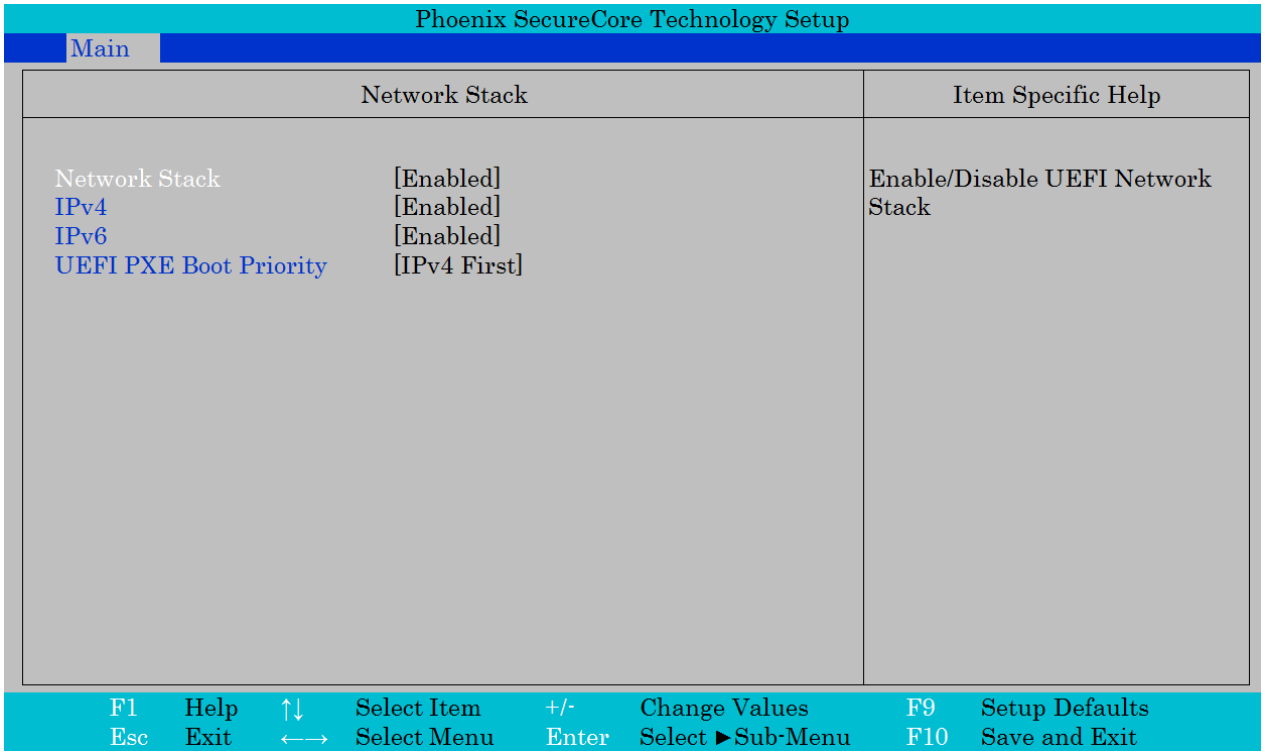
Boot Features


Phoenix SecureCore Technology Setup
Main
Boot Features
Item Specific Help
NumLock: [On]
Timeout [2]
CSM Support [Yes]
Diagnostic Splash Screen [Disabled]
Diagnostic Summary Screen [Disabled]
BIOS Level USB [Enabled]
USB Legacy [Enabled]
Console Redirection [Disabled]
Allow Hotkey in S4 resume [Enabled]
UEFI Boot [Enabled]
Legacy Boot [Enabled]
Boot in Legacy Video Mode [Disabled]
Load OPROM [On Demand]
Select Power-on state for NumLock.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
NumLock:	**On** Off	Select Power-on state for NumLock.
Timeout	2 Note 1	Number of seconds that P.O.S.T will wait for the user input before booting.
CSM Support	No **Yes**	Compatibility Support Module that provides backward compatibility services for legacy BIOS services, like int10/int13, dependent OS.
Diagnostic Splash Screen	**Disabled** Enabled	If you select 'Enabled' the diagnostic splash screen always displays during boot. If you select 'Disabled' the diagnostic splash screen does not display unless you press HOTKEY during boot.
Diagnostic Summary Screen	**Disabled** Enabled	Display the diagnostic summary screen during boot.
BIOS Level USB	Disabled **Enabled**	Enable/Disable all all BIOS support for USB in order to reduce boot time. Note that this will prevent using a USB keyboard in setup or a USB biometric scanner such as a finger print reader to control access to setup, but does not prevent the operating system for supporting such hardware.
USB Legacy	Disabled **Enabled**	Enable/Disable USB BIOS SMM support for mouse, keyboard, mass storage, etc. in legacy operating systems such as DOS.
Console Redirection	**Disabled** Enabled	Enable/Disable Universal Console Redirection.
Allow Hotkey in S4 resume	Disabled **Enabled**	Enable hotkey detection when system resuming from Hibernate state.
UEFI Boot	**Disabled** Enabled	Enable the UEFI boot.
Legacy Boot	Disabled **Enabled**	Enable the Legacy boot.
Boot in Legacy Video Mode	**Disabled** Enabled	Enable to force the display adapter to switch the video mode to Text Mode 3 at the end of BIOS POST for non-UEFI boot mode (Legacy Boot). Some legacy software, such as DUET, requires that the BIOS explicitly enter text video mode prior to boot.
Load OPROM	All **On Demand**	Load all OPROMs or on demand according to the boot device.

Note 1: Use either digit keys to enter value (0 – 99) or +/- keys to increase/decrease value.

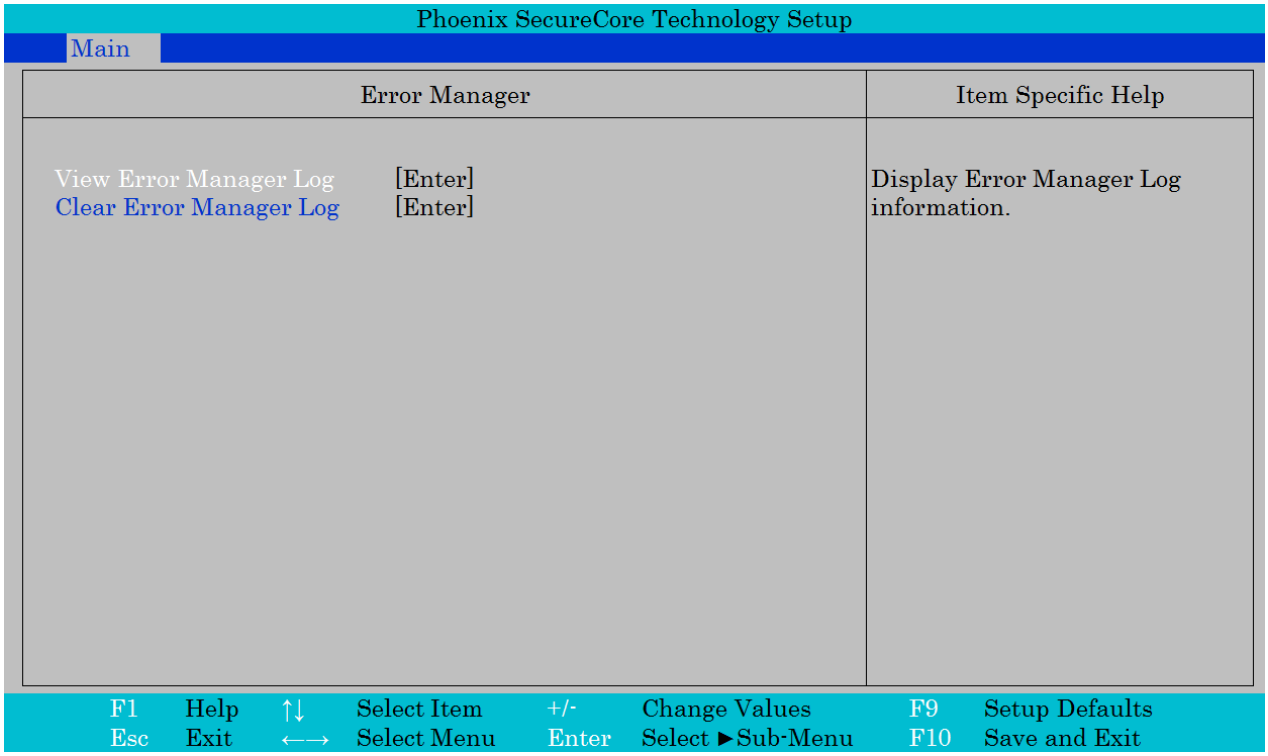
Network Stack


Phoenix SecureCore Technology Setup
Main
Network Stack
Item Specific Help
Network Stack [Enabled]
IPv4 [Enabled]
IPv6 [Enabled]
UEFI PXE Boot Priority [IPv4 First]
Enable/Disable UEFI Network Stack
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Network Stack	**Disabled** Enabled	Enable/Disable UEFI Network Stack
IPv4 (Note 1)	Disabled **Enabled**	Enable/Disable IPv4
IPv6 (Note 1)	Disabled **Enabled**	Enable/Disable IPv6
UEFI PXE Boot Priority (Note 1)	IPv6 First **IPv4 First**	Set the priority of UEFI PXE Boot

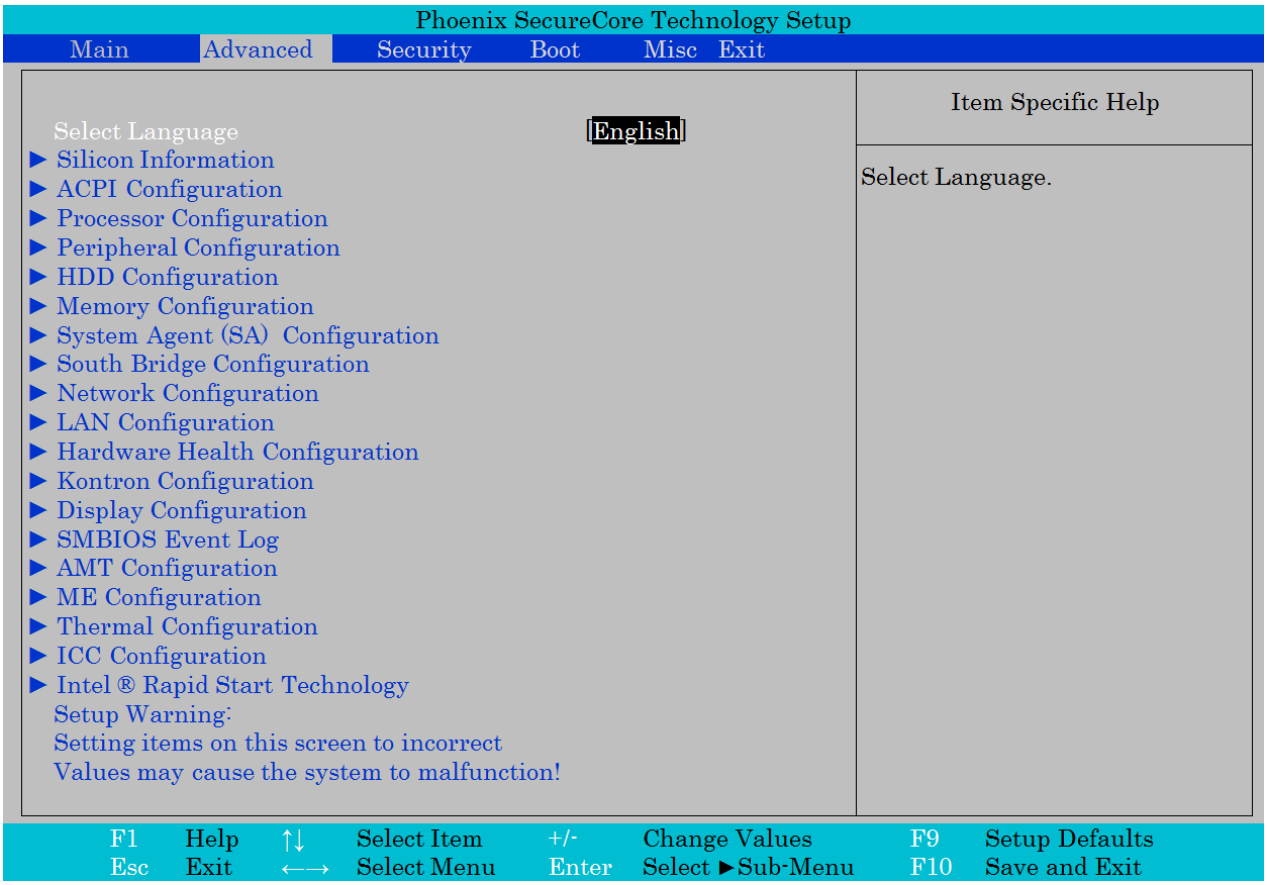
Note 1: Only visible if Network Stack is enabled.

Error Manager


Phoenix SecureCore Technology Setup
Main
Error Manager
Item Specific Help
View Error Manager Log [Enter]
Clear Error Manager Log [Enter]
Display Error Manager Log information.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
View Error Manager Log	**Enter**	Display Error Manager Log information.
Clear Error Manager Log	**Enter**	Clear Error Manager Log.

10.2 Advanced

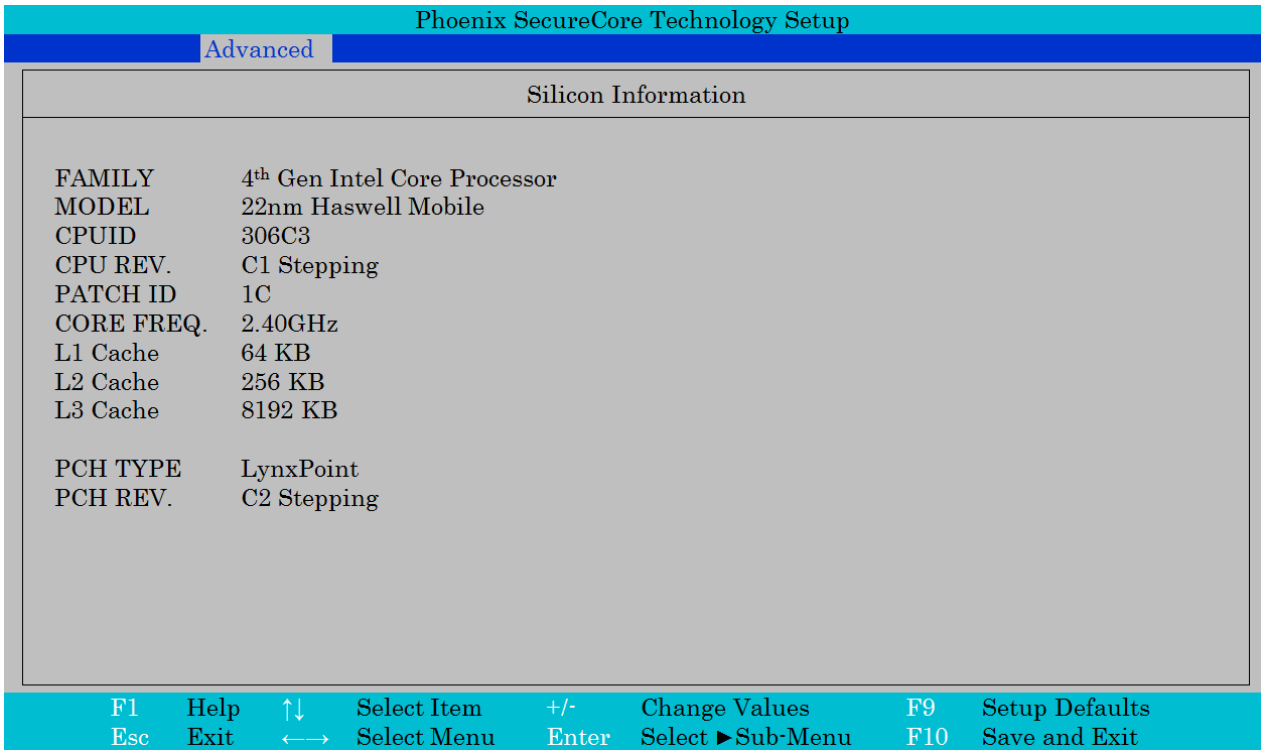


The Advanced (main) menu contains only submenu selections which will be described in more details on the following pages.

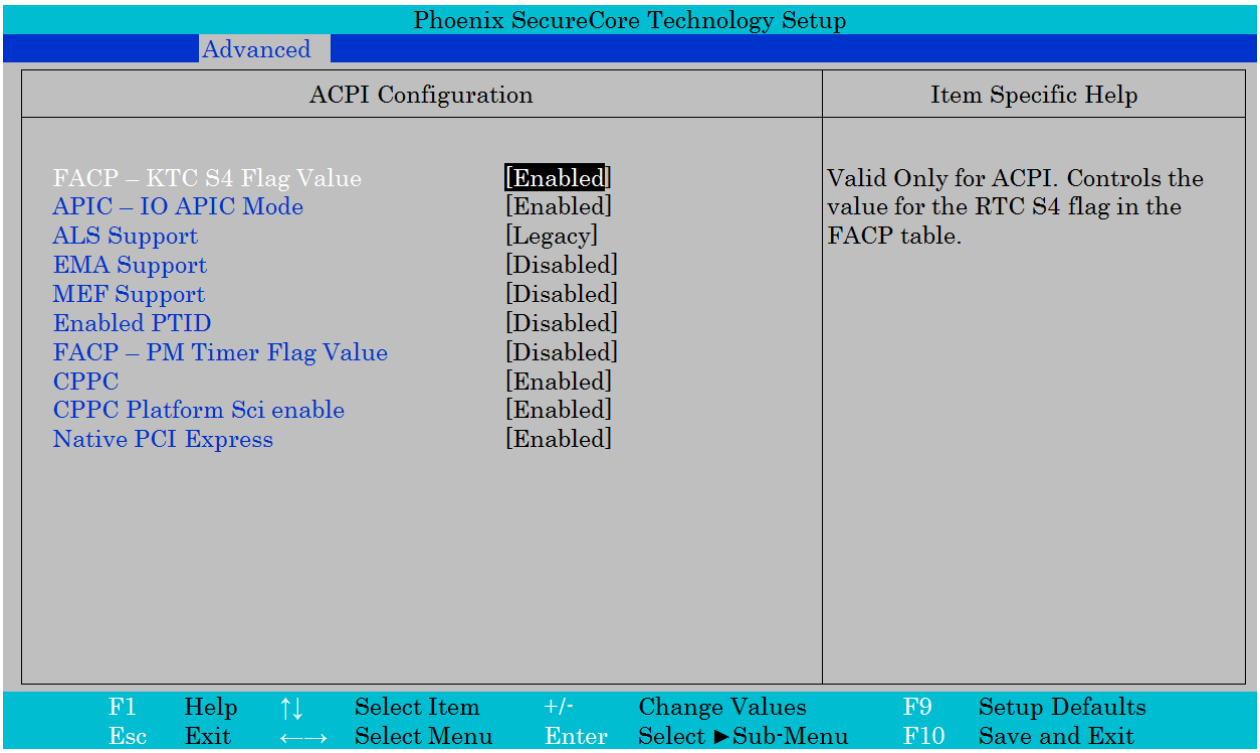
In order to make a selection of a submenu activated the ↑↓ keys until the requested submenu becomes white color, then activate the <Enter>.

Function	Selection	Description
Select Language	**English** Francais Etc.	Select Language.

Silicon Information

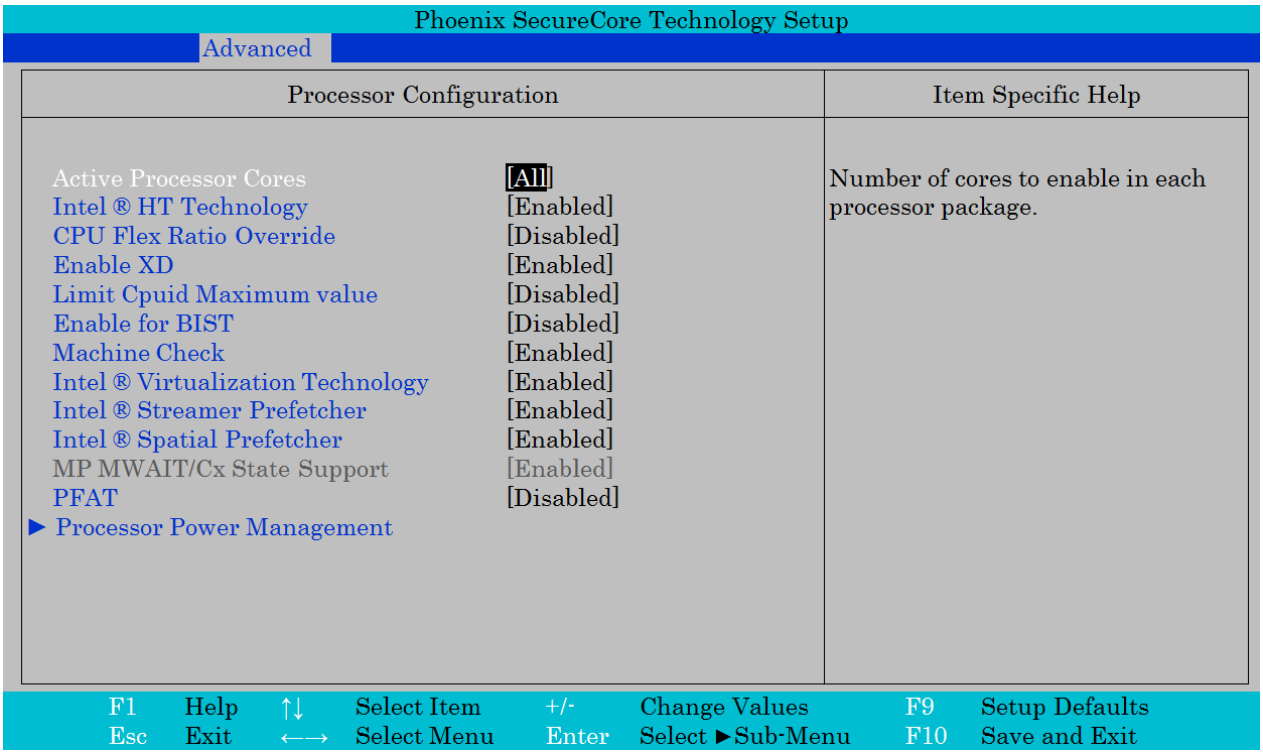

Phoenix SecureCore Technology Setup
Advanced
Silicon Information
FAMILY 4th Gen Intel Core Processor
MODEL 22nm Haswell Mobile
CPUID 306C3
CPU REV. C1 Stepping
PATCH ID 1C
CORE FREQ. 2.40GHz
L1 Cache 64 KB
L2 Cache 256 KB
L3 Cache 8192 KB
PCH TYPE LynxPoint
PCH REV. C2 Stepping
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

ACPI Configuration


Phoenix SecureCore Technology Setup
Advanced
ACPI Configuration
Item Specific Help
FACP – KTC S4 Flag Value [Enabled]
APIC – IO APIC Mode [Enabled]
ALS Support [Legacy]
EMA Support [Disabled]
MEF Support [Disabled]
Enabled PTID [Disabled]
FACP – PM Timer Flag Value [Disabled]
CPPC [Enabled]
CPPC Platform Sci enable [Enabled]
Native PCI Express [Enabled]
Valid Only for ACPI. Controls the value for the RTC S4 flag in the FACP table.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

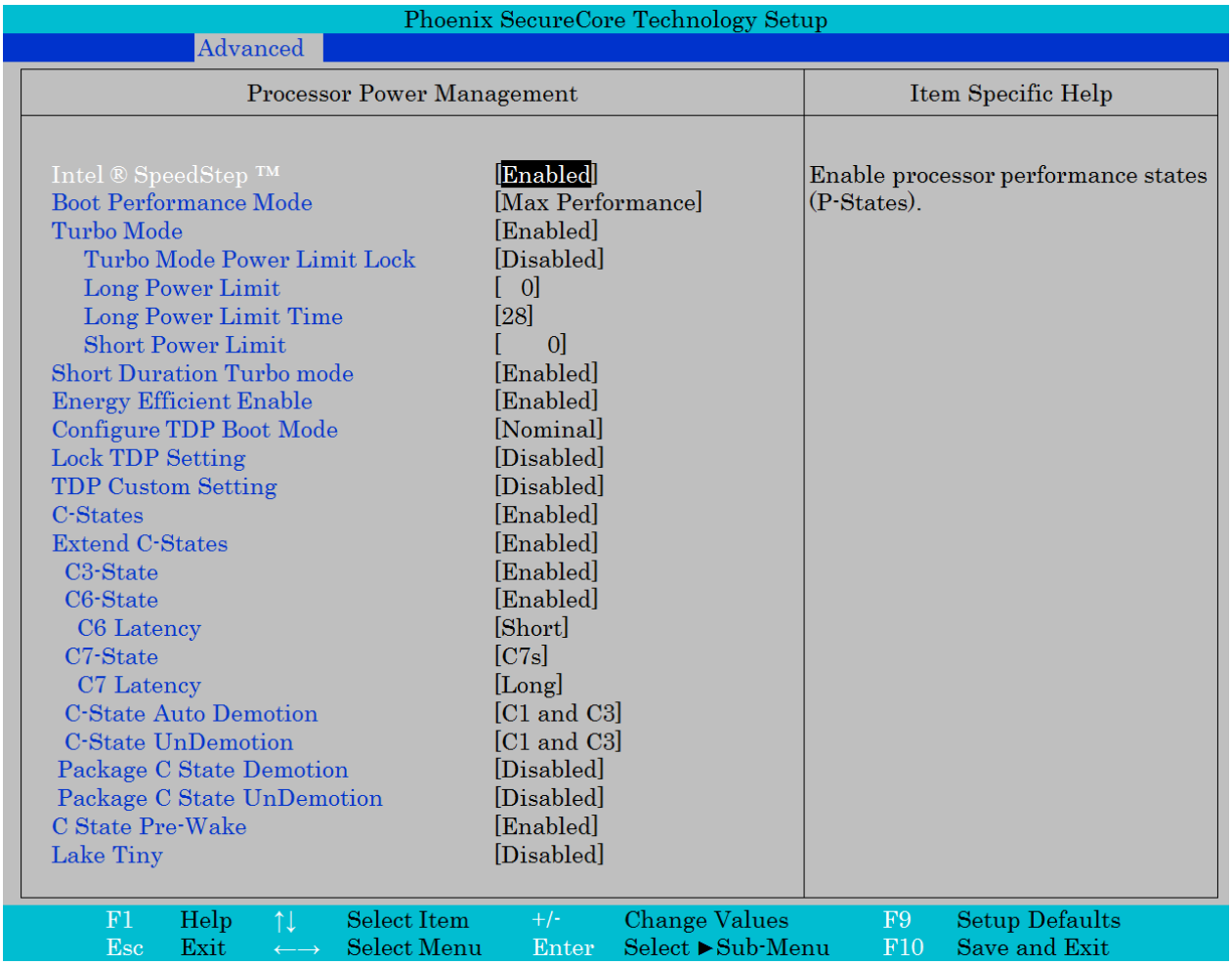
Function	Selection	Description
FACP – KTC S4 Flag Value	Disabled **Enabled**	Valid Only for ACPI. Controls the value for the RTC S4 flag in the FACP table.
APIC – IO APIC Mode	Disabled **Enabled**	This is valid only for WIN2000, Windows XP. A fresh install of OS must occur when APIC mode is enabled. The APIC table will be pointed to by the RSDT, the Local APIC will be initialized, and the proper enable bits are set in the PCH.
ALS Support	**Legacy** ACPI	Valid only for ACPI. Legacy = ALS support through the IGD INT10 function. ACPI = ALS support through an ACPI ALS driver.
EMA Support	**Disabled** Enabled	Valid only for ACPI. Controls the EMA device in an ACPI environment.
MEF Support	**Disabled** Enabled	Valid only for ACPI. Controls the Mobile East Fork feature support in an ACPI environment.
Enabled PTID	**Disabled** Enabled	Enable/Disable Power and Temperature Instrumentation Details.
FACP – PM Timer Flag Value	**Disabled** Enabled	Valid only for ACPI. Controls the PM Timer Flag Value in the FACP table.
CPPC	Disabled **Enabled**	ACPI 5.0 Collaborative Processor Performance Control. When CPPC is enabled, the newer ACPI 5.0 method for processor performance control will be used. When disabled, the older methods (P-State and T-State) will be used.
CPPC Platform Sci enable	Disabled **Enabled**	When enabled, the platform will generate a GPE/SCI upon CPPC command completion. If disabled, the OS must poll for command completion.
Native PCI Express	Disabled **Enabled**	Native PCI Express Enable/Disable

Processor Configuration


Phoenix SecureCore Technology Setup
Advanced
Processor Configuration
Item Specific Help
Active Processor Cores [All]
Intel ® HT Technology [Enabled]
CPU Flex Ratio Override [Disabled]
Enable XD [Enabled]
Limit Cpuid Maximum value [Disabled]
Enable for BIST [Disabled]
Machine Check [Enabled]
Intel ® Virtualization Technology [Enabled]
Intel ® Streamer Prefetcher [Enabled]
Intel ® Spatial Prefetcher [Enabled]
MP MWAIT/Cx State Support [Enabled]
PFAT [Disabled]
► Processor Power Management
Number of cores to enable in each processor package.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ►Sub-Menu F10 Save and Exit

Function	Selection	Description
Active Processor Cores	**All** 1 2 3	Number of cores to enable in each processor package.
Intel ® HT Technology	Disabled **Enabled**	When Disabled only one thread per enabled core is enabled.
CPU Flex Ratio Override	**Disabled** Enabled	Enable/Disable CPU Flex Ratio Programming
Enable XD	Disabled **Enabled**	Enabled Execute Disabled functionality. Also known as Data Execution Prevention (DEP).
Limit Cpuid Maximum value	**Disabled** Enabled	When set to enable, this causes the cupid to return maximum value of 3.
Enable for BIST	**Disabled** Enabled	Enable/Disable BIST (Built-In Self Test) on reset.
Machine Check	Disabled **Enabled**	Enable processor Machine Check feature (disable only for test).
Intel ® Virtualization Technology	Disabled **Enabled**	When enabled. A VMM can utilize the additional hardware capabilities.
Intel ® Streamer Prefetcher	Disabled **Enabled**	Enable or disable MLC Streamer Prefetcher.
Intel ® Spatial Prefetcher	Disabled **Enabled**	Enable or disable MLC Spatial Prefetcher
MP MWAIT/Cx State Support	Disabled **Enabled**	
PFAT	**Disabled** Enabled	Enable/Disable PFAT (Platform Firmware Armoring Technology) feature.

Processor Power Management

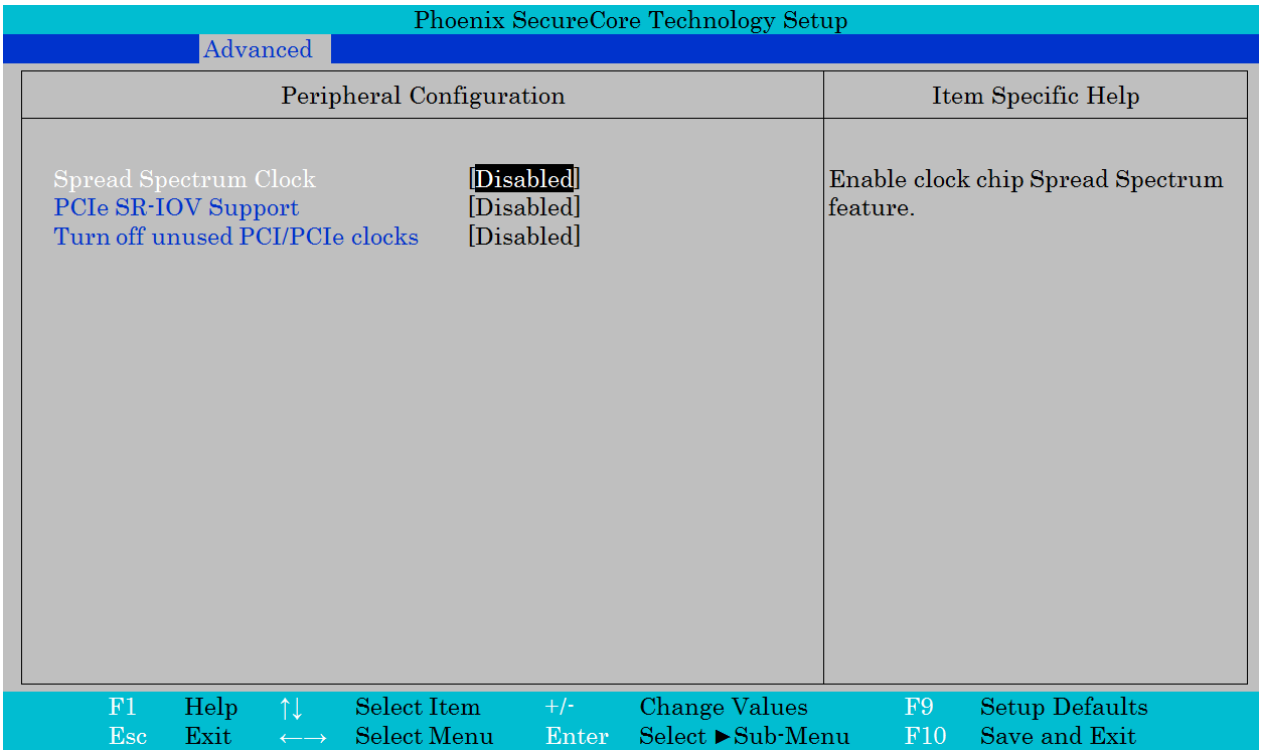

Phoenix SecureCore Technology Setup
Advanced
Processor Power Management
Item Specific Help
Intel ® SpeedStep ™ [Enabled]
Boot Performance Mode [Max Performance]
Turbo Mode [Enabled]
Turbo Mode Power Limit Lock [Disabled]
Long Power Limit [0]
Long Power Limit Time [28]
Short Power Limit [0]
Short Duration Turbo mode [Enabled]
Energy Efficient Enable [Enabled]
Configure TDP Boot Mode [Nominal]
Lock TDP Setting [Disabled]
TDP Custom Setting [Disabled]
C-States [Enabled]
Extend C-States [Enabled]
C3-State [Enabled]
C6-State [Enabled]
C6 Latency [Short]
C7-State [C7s]
C7 Latency [Long]
C-State Auto Demotion [C1 and C3]
C-State UnDemotion [C1 and C3]
Package C State Demotion [Disabled]
Package C State UnDemotion [Disabled]
C State Pre-Wake [Enabled]
Lake Tiny [Disabled]
Enable processor performance states (P-States).
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Intel ® SpeedStep ™	Disabled **Enabled**	Enable processor performance states (P-States).
Boot Performance Mode	**Max Performance** Max Battery Auto	Select the performance state that the BIOS sets before OS handoff.
Turbo Mode	Disabled **Enabled**	Enable processor Turbo Mode. EMTTM must also be enabled.
Turbo Mode Power Limit Lock	**Disabled** Enabled	Enable/Disable Locking of turbo settings. When Enabled, TURBO_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
Long Power Limit	**0**, 1,2,...200	Turbo Mode Long Duration Power Limit (aka Power Limit 1) in Watts. The value may vary from 0 to Fused Value. If the value is 0, the fused value will be programmed. A value greater than fused TDP value will not be programmed.

Continue

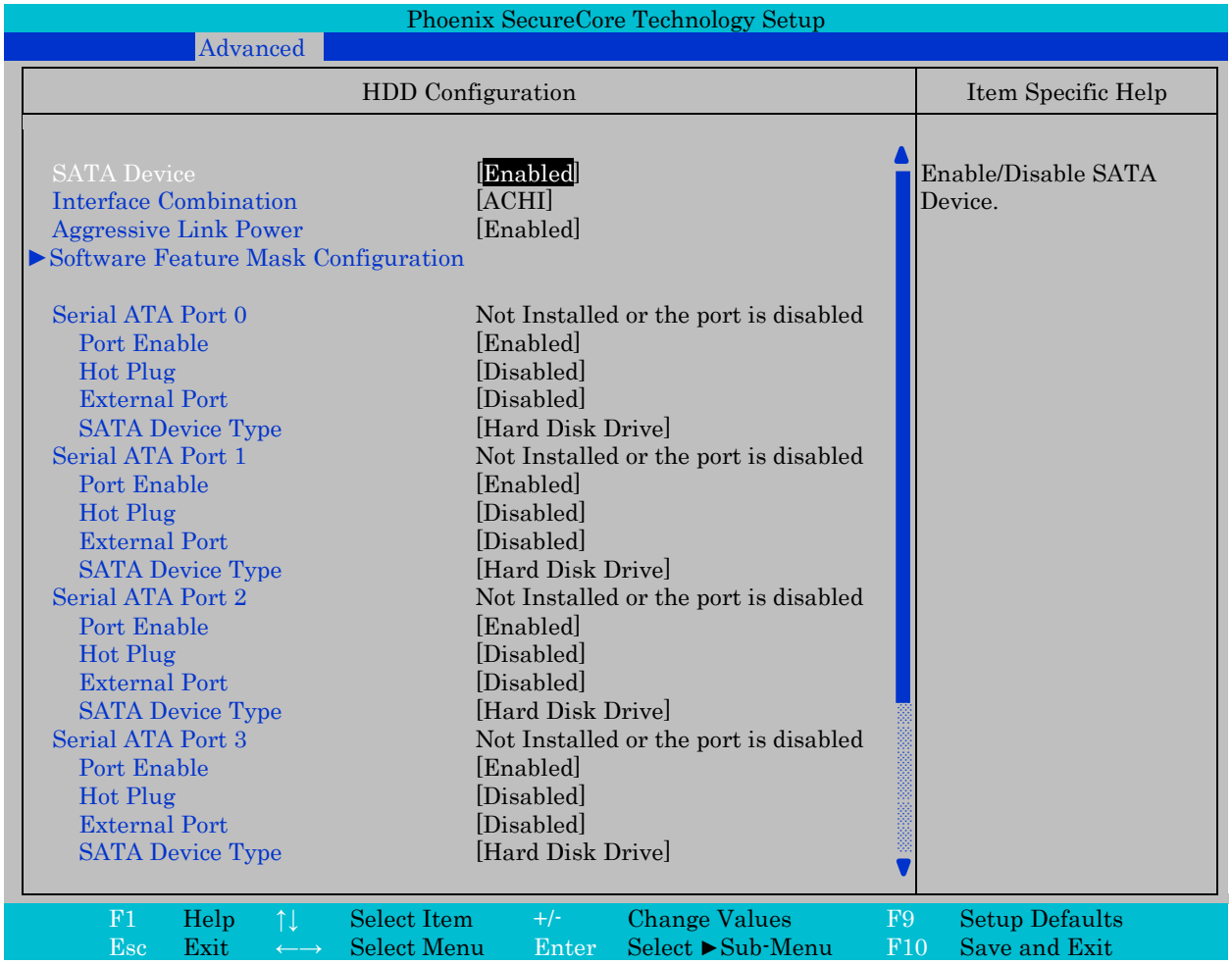
Function	Selection	Description
Long Power Limit Time	0,1... **28**,...55,56	Long Duration Time Window (aka Power Limit 1 Time) value in seconds. The value may vary from 0 to 56. Indicates the time window over which TDP value should be maintained. If the value is 0, the fused value will be programmed.
Short Power Limit	**0**, 1, ... 32767	Turbo Mode Long Duration Power Limit (aka Power Limit 2) in Watts. The value may vary from 0 to Fused Value. If the value is 0, the fused value will be programmed. A value greater than fused TDP value will not be programmed.
Short Duration Turbo mode	Disabled **Enabled**	Enable Short Duration Turbo mode for processor.
Energy Efficient Enable	Disabled **Enabled**	Enable Energy Efficient for processor.
Configure TDP Boot Mode	**Nominal** Down Up Disabled	Configure TDP Mode as [Nominal] [Up] [Down] [Disabled] TDP selection. Disabled options will skip all cTDP boot configurations but dynamic cTDP can still work.
Lock TDP Setting	**Disabled** Enabled	Lock TDP in MSR_CONFIG_TDP_CONTROL
TDP Custom Setting	**Disabled** Enabled	Use TDP Custom Setting.
C-States	Disabled **Enabled**	Enable processor idle power saving states (C-States).
Extend C-States	Disabled **Enabled**	Enable C-State transitions to occur in combination with P-States.
C3-State	Disabled **Enabled**	Enable processor idle power saving C3 state.
C6-State	Disabled **Enabled**	Enable processor idle power saving C6 state.
C6 Latency	**Short** Long	Configure Short/Long Latency.
C7-State	**Disabled** Enabled	Enable processor idle power saving C7 state.
C7 Latency	Short **Long**	Configure Short/Long Latency.
C-State Auto Demotion	Disabled C1 C3 **C1 and C3**	Configure C-State Auto Demotion.
C-State UnDemotion	Disabled C1 C3 **C1 and C3**	Configure C-State Auto UnDemotion.
Package C State Demotion	**Disabled** Enabled	Enable/Disable Package C State Demotion.
Package C State UnDemotion	**Disabled** Enabled	Enable/Disable Package C State UnDemotion.
C State Pre-Wake	Disabled **Enabled**	Enable/Disable C State Pre-Wake.
Lake Tiny	**Disabled** Enabled	Lake Tiny Settings.

Peripheral Configuration


Phoenix SecureCore Technology Setup
Advanced
Peripheral Configuration
Item Specific Help
Spread Spectrum Clock [Disabled]
PCIe SR-IOV Support [Disabled]
Turn off unused PCI/PCIe clocks [Disabled]
Enable clock chip Spread Spectrum feature.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Spread Spectrum Clock	**Disabled** Enabled	Enable clock chip Spread Spectrum feature.
PCIe SR-IOV Support	**Disabled** Enabled	Set IO Virtualization.
Turn off unused PCI/PCIe clocks	**Disabled** Enabled	Disabled: all clocks turned on. Enabled: clocks for empty PCI/PCIe slots will be turned off to save power, especially for EMI test. Platform must be powered off for changes to take effect.

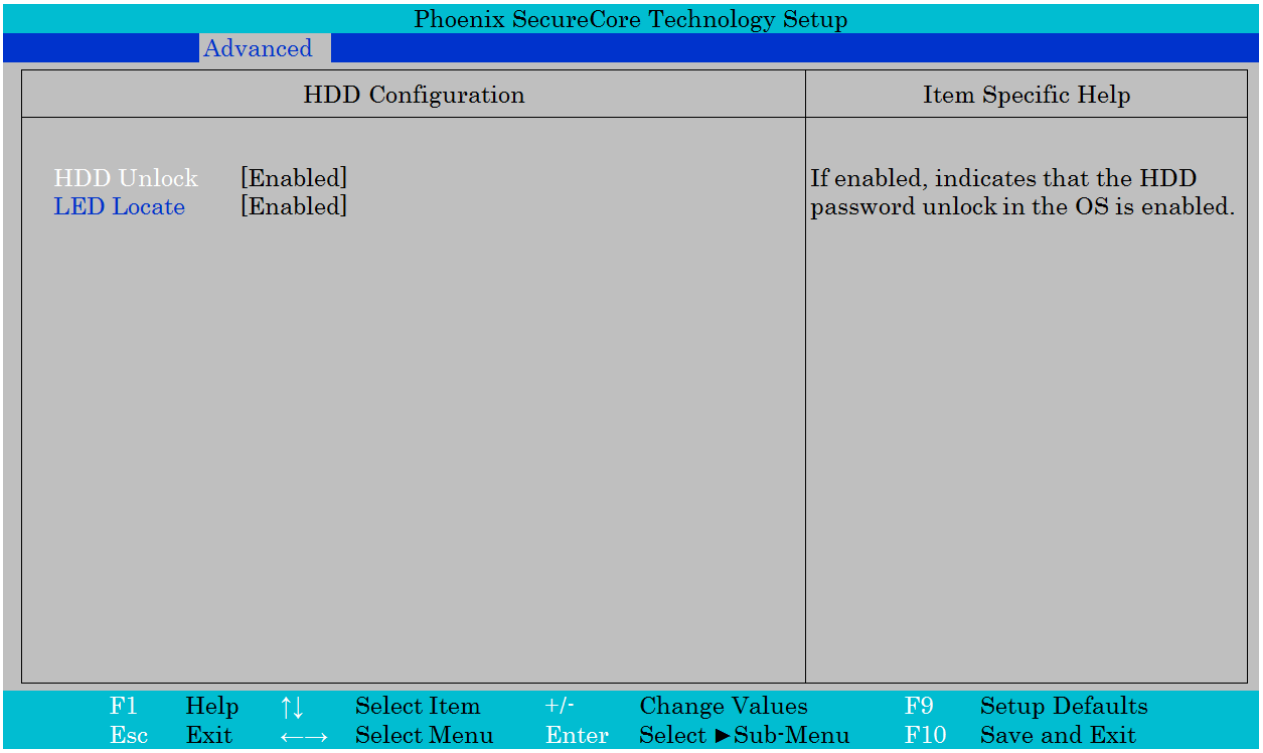
HDD Configuration


Phoenix SecureCore Technology Setup
Advanced
HDD Configuration
Item Specific Help
SATA Device [Enabled]
Interface Combination [ACHI]
Aggressive Link Power [Enabled]
▶Software Feature Mask Configuration
Serial ATA Port 0 Not Installed or the port is disabled
Port Enable [Enabled]
Hot Plug [Disabled]
External Port [Disabled]
SATA Device Type [Hard Disk Drive]
Serial ATA Port 1 Not Installed or the port is disabled
Port Enable [Enabled]
Hot Plug [Disabled]
External Port [Disabled]
SATA Device Type [Hard Disk Drive]
Serial ATA Port 2 Not Installed or the port is disabled
Port Enable [Enabled]
Hot Plug [Disabled]
External Port [Disabled]
SATA Device Type [Hard Disk Drive]
Serial ATA Port 3 Not Installed or the port is disabled
Port Enable [Enabled]
Hot Plug [Disabled]
External Port [Disabled]
SATA Device Type [Hard Disk Drive]
Enable/Disable SATA Device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

"Software Feature Mask Configuration" see next page.

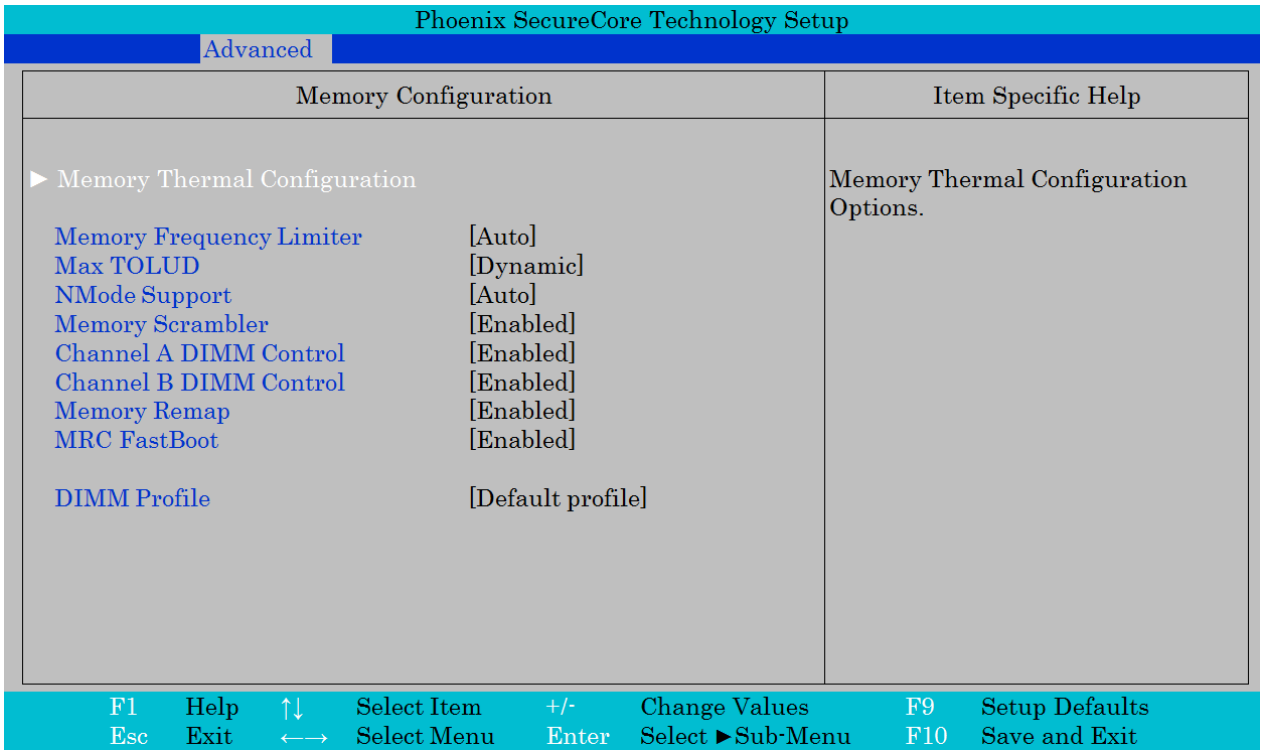
Function	Selection	Description
SATA Device	Disabled **Enabled**	Enable/Disable SATA Device.
Interface Combination	IDE **AHCI** RAID	Select the SATA controllers operation mode.
Serial ATA Port x (x = 0 – 3)	(Device if installed)	
Port Enable	Disabled **Enabled**	Enable/Disable this port.
Hot Plug	**Disabled** Enabled	Designates the port as Hot Pluggable. Note: Requires hardware support.
External Port	**Disabled** Enabled	Configure system to treat the port as internal or external.
SATA Device Type	**Hard Disk Drive** Solid State Drive	Select ´Solid State Drive´ only if a Solid State Drive is connected to this SATA port.

Software Feature Mask Configuration


Phoenix SecureCore Technology Setup
Advanced
HDD Configuration
Item Specific Help
HDD Unlock [Enabled]
LED Locate [Enabled]
If enabled, indicates that the HDD password unlock in the OS is enabled.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
HDD Unlock	Disabled **Enabled**	If enabled, indicates that the HDD password unlock in the OS is enabled.
LED Locate	Disabled **Enabled**	If enabled, indicates that the LED/SGPIO hardware is attached and ping to locate feature is enabled on the OS.

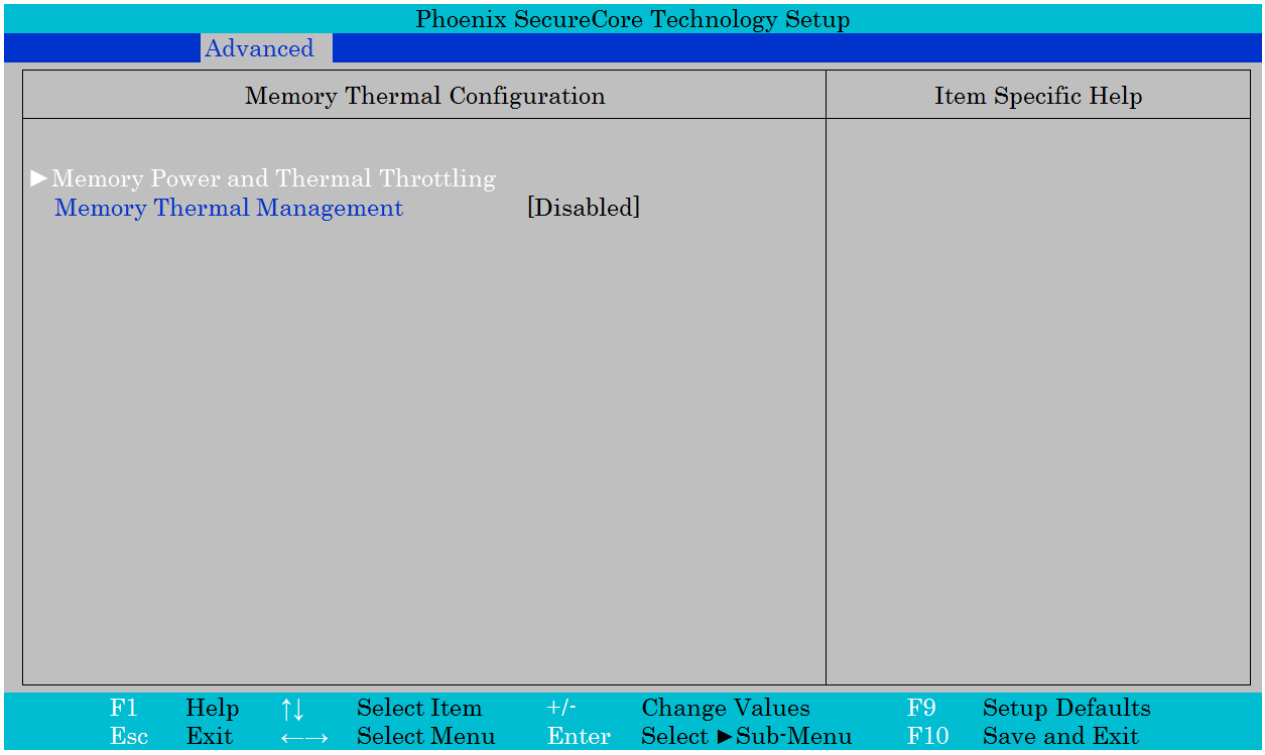
Memory Configuration


Phoenix SecureCore Technology Setup
Advanced
Memory Configuration
Item Specific Help
► Memory Thermal Configuration
Memory Thermal Configuration Options.
Memory Frequency Limiter [Auto]
Max TOLUD [Dynamic]
NMode Support [Auto]
Memory Scrambler [Enabled]
Channel A DIMM Control [Enabled]
Channel B DIMM Control [Enabled]
Memory Remap [Enabled]
MRC FastBoot [Enabled]
DIMM Profile [Default profile]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ►Sub-Menu F10 Save and Exit

"Memory Thermal Configuration" see next pages.

Function	Selection	Description
Memory Frequency Limiter	**Auto** 1067 1333 1600 1867 2133 2400 2667	Maximum Memory Frequency Selections in Mhz.
Max TOLUD	**Dynamic** 1 GB 1.25 GB 1.5 GB 1.75GB 2 GB 2.25 GB 2.5 GB 2.75 GB 3 GB 3.25 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
NMode Support	**Auto** 1N Mode 2N Mode	Enable/Disable system to support N Mode.
Memory Scrambler	Disabled **Enabled**	Enable/Disable Memory Scrambler support.
Channel A DIMM Control	Disabled **Enabled**	Enable/Disable Channel A DIMM.
Channel B DIMM Control	Disabled **Enabled**	Enable/Disable Channel B DIMM.
Memory Remap	Disabled **Enabled**	Enable/Disable Memory Remap above 4GB.
MRC FastBoot	Disabled **Enabled**	Enable/Disable MRC FastBoot. Generally, this option only takes effect when doing cold boots/resets.
DIMM Profile	**Default profile** Custom profile XMP profile 1	SPD XMP profile selection – for XMP supported DIMM.

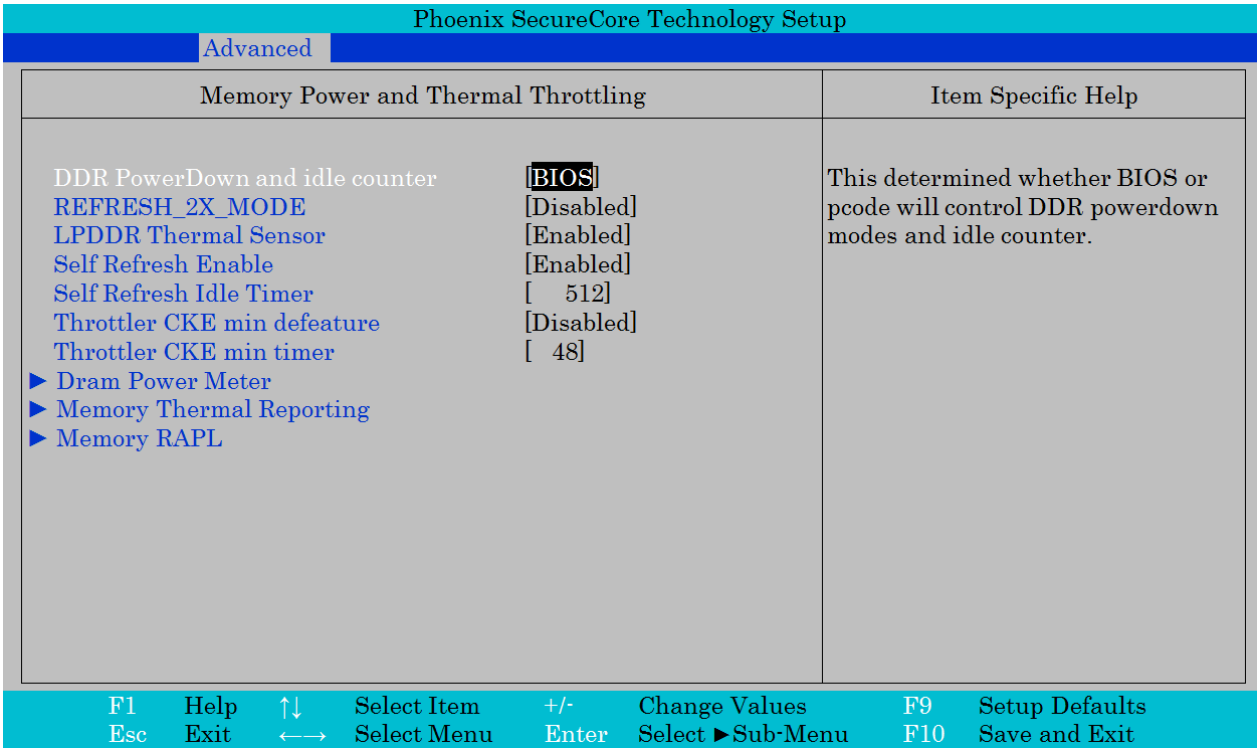
Memory Thermal Configuration


Phoenix SecureCore Technology Setup
Advanced
Memory Thermal Configuration
Item Specific Help
►Memory Power and Thermal Throttling
Memory Thermal Management [Disabled]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ►Sub-Menu F10 Save and Exit

"Memory Power and Thermal Throttling" see next page.

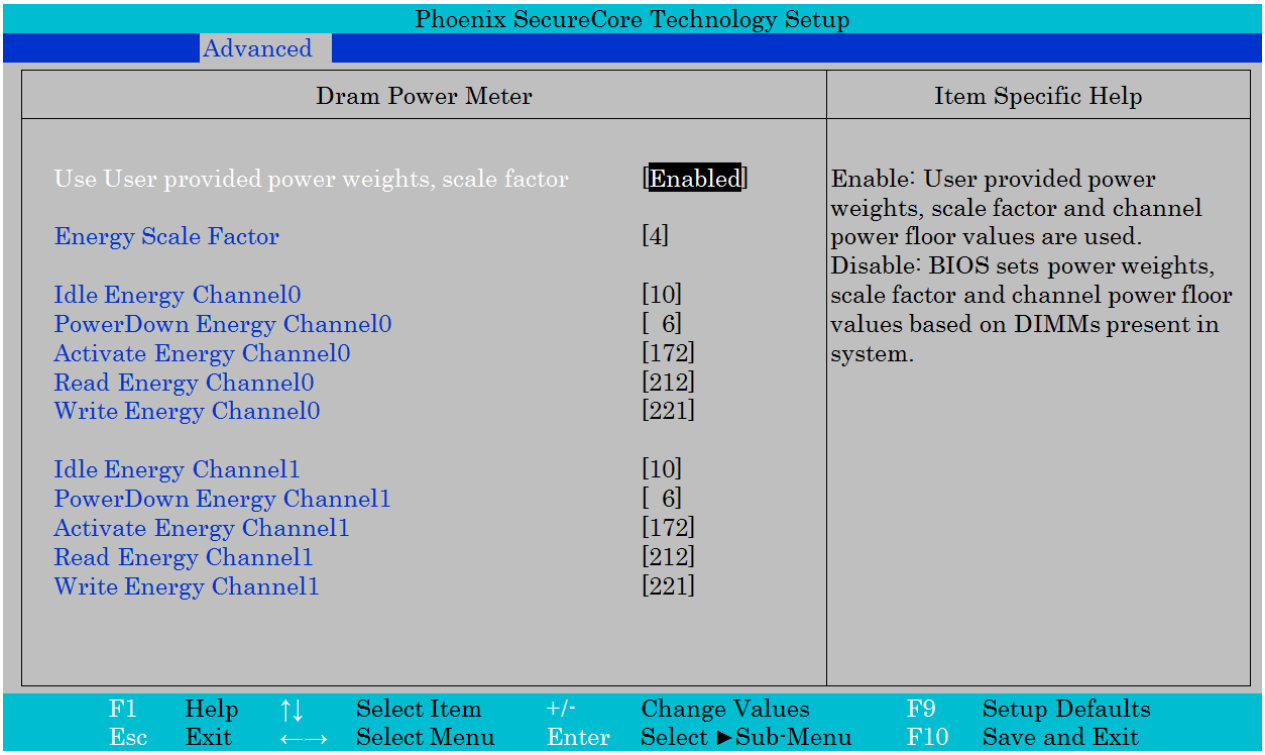
Function	Selection	Description
Memory Thermal Management	Disabled **Enabled**	Memory Thermal Management Enable/Disable.

Memory Power and Thermal Throttling


Phoenix SecureCore Technology Setup
Advanced
Memory Power and Thermal Throttling
Item Specific Help
DDR PowerDown and idle counter [BIOS]
REFRESH_2X_MODE [Disabled]
LPDDR Thermal Sensor [Enabled]
Self Refresh Enable [Enabled]
Self Refresh Idle Timer [512]
Throttler CKE min defeature [Disabled]
Throttler CKE min timer [48]
▶ Dram Power Meter
▶ Memory Thermal Reporting
▶ Memory RAPL
This determined whether BIOS or pcode will control DDR powerdown modes and idle counter.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

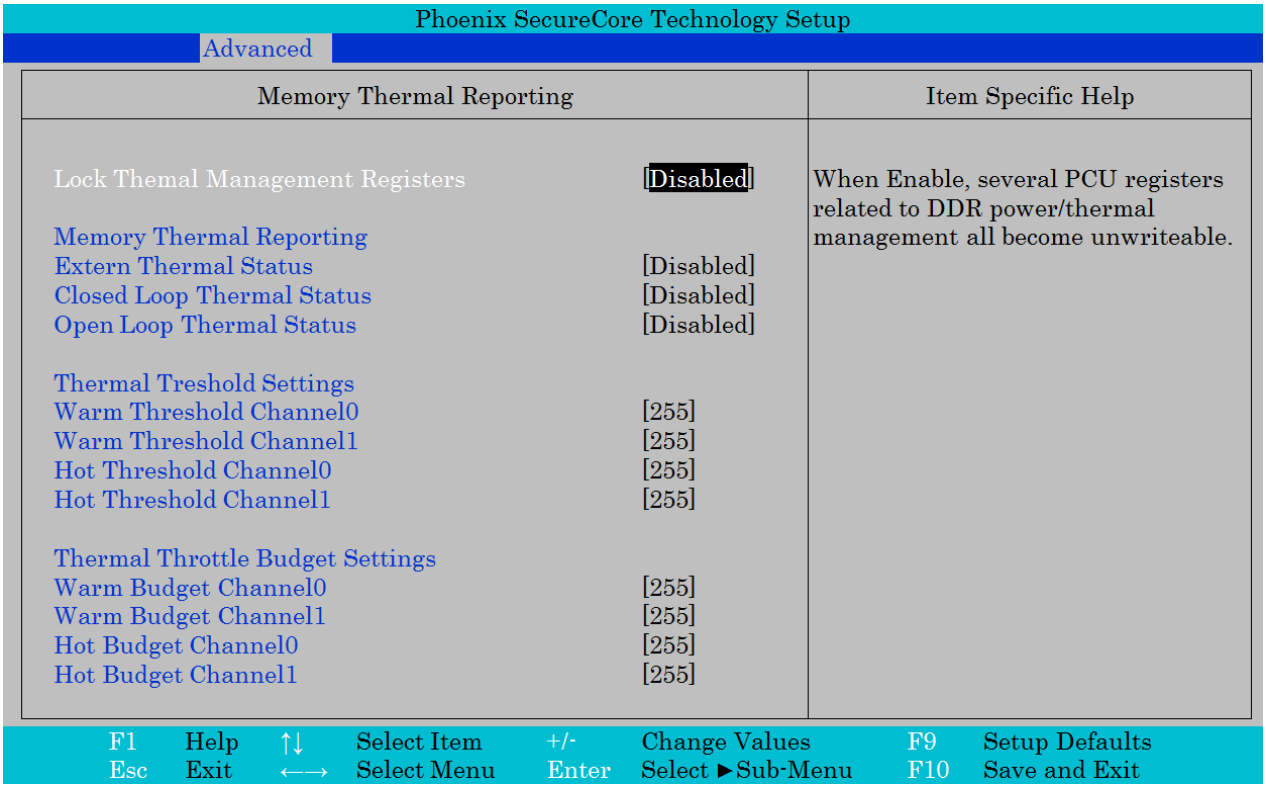
Function	Selection	Description
DDR PowerDown and idle counter	PCODE **BIOS**	This determined whether BIOS or pcode will control DDR powerdown modes and idle counter.
REFRESH_2X_MODE	**Disabled** Enabled for WARM or HOT Enabled HOT only	Disabled, or iMC enables 2xRefresh when Warm or Hot, or iMC enables 2xRefresh when Hot.
LPDDR Thermal Sensor	Disabled **Enabled**	When enabled, MC uses MR4 to read LPDDR thermal sensor.
Self Refresh Enable	Disabled **Enabled**	Enable/Disable Self Refresh Enable.
Self Refresh Idle Timer	**512**	Range [64K-1: 512]
Throttler CKE min defeature	Disabled **Enabled**	Enable/Disable Throttler CKE min defeature.
Throttler CKE min timer	**48**	Timer value for CKE min. Range [255;0]

Dram Power Meter


Phoenix SecureCore Technology Setup
Advanced
Dram Power Meter
Item Specific Help
Use User provided power weights, scale factor [Enabled]
Energy Scale Factor [4]
Idle Energy Channel0 [10]
PowerDown Energy Channel0 [6]
Activate Energy Channel0 [172]
Read Energy Channel0 [212]
Write Energy Channel0 [221]
Idle Energy Channel1 [10]
PowerDown Energy Channel1 [6]
Activate Energy Channel1 [172]
Read Energy Channel1 [212]
Write Energy Channel1 [221]
Enable: User provided power weights, scale factor and channel power floor values are used. Disable: BIOS sets power weights, scale factor and channel power floor values based on DIMMs present in system.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

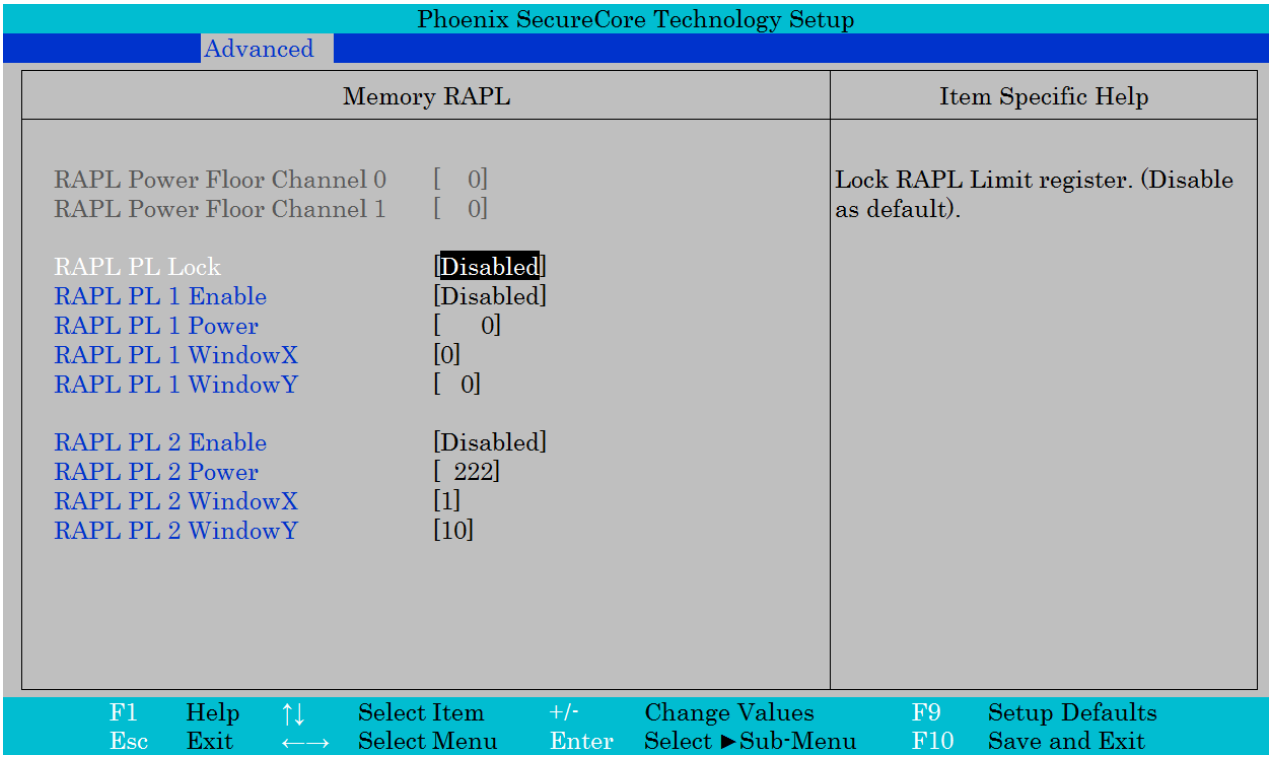
Function	Selection	Description
Use User provided power weights, scale factor	**Disabled** Enabled	Enable: User provided power weights, scale factor and channel power floor values are used. Disable: BIOS sets power weights, scale factor and channel power floor values based on DIMMs present in system.
Energy Scale Factor	0,1, ...**4**,...7	Range[7;0] = [7.3pJ;931.3pJ]. The default reset value is 3 = 116.4pJ.
Idle Energy Channel0/1	0,1,...**10**,...63	Idle Energy consumed by DIMM for one clock cycle when the DIMM is idle with cke on. Range [63;0].
PowerDown Energy Channel0/1	0,1,...**10**,...63	PowerDown Energy consumed by DIMM for one clock cycle when the DIMM is idle with cke off. Range [63;0].
Activate Energy Channel0/1	0,1,... **172**,...255	Activate Energy contribution. Range [255;0].
Read Energy Channel0/1	0,1,... **212**,...255	Read Energy contribution. Range [255;0].
Write Energy Channel0/1	0,1,... **221**,...255	Write Energy contribution. Range [255;0].

Memory Thermal Reporting


Phoenix SecureCore Technology Setup
Advanced
Memory Thermal Reporting
Item Specific Help
Lock Themal Management Registers [Disabled]
When Enable, several PCU registers related to DDR power/thermal management all become unwriteable.
Memory Thermal Reporting
Extern Thermal Status [Disabled]
Closed Loop Thermal Status [Disabled]
Open Loop Thermal Status [Disabled]
Thermal Treshold Settings
Warm Threshold Channel0 [255]
Warm Threshold Channel1 [255]
Hot Threshold Channel0 [255]
Hot Threshold Channel1 [255]
Thermal Throttle Budget Settings
Warm Budget Channel0 [255]
Warm Budget Channel1 [255]
Hot Budget Channel0 [255]
Hot Budget Channel1 [255]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Lock Themal Management Registers	**Disabled** Enabled	When Enable, several PCU registers related to DDR power/thermal management all become unwriteable.
Extern Thermal Status	**Disabled** Enabled	Disable: pcode ignores the external thermal status. Enable, the value from external thermal status is used.
Closed Loop Thermal Status	**Disabled** Enabled	CLTM pcode algorithm will be used to compute the memory thermal status. Note: CLTM will preceed OLTM.
Open Loop Thermal Status	**Disabled** Enabled	OLTM pcode algorithm will be used to compute the memory thermal status. Note: CLTM will preceed OLTM.
Warm Threshold Channel0/1	0,1,...**255**	Range [255;0] = [31.875;0] in Watt.
Hot Threshold Channel0/1	0,1,...**255**	Range [255;0] = [31.875;0] in Watt.
Warm Budget Channel0/1	0,1,...**255**	Range [255;0] = [31.875;0] in Watt.
Hot Budget Channel0/1	0,1,...**255**	Range [255;0] = [31.875;0] in Watt.

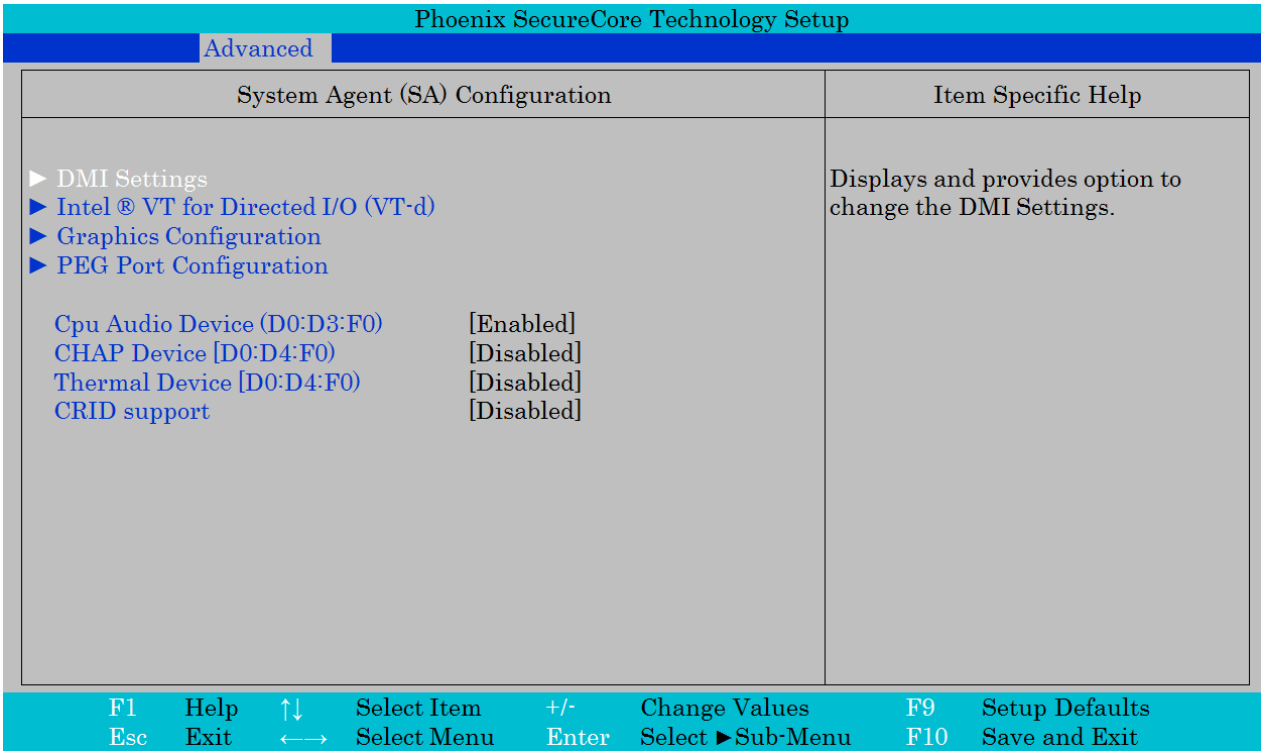
Memory RAPL


Phoenix SecureCore Technology Setup
Advanced
Memory RAPL
Item Specific Help
RAPL Power Floor Channel 0 [0]
RAPL Power Floor Channel 1 [0]
RAPL PL Lock [Disabled]
RAPL PL 1 Enable [Disabled]
RAPL PL 1 Power [0]
RAPL PL 1 WindowX [0]
RAPL PL 1 WindowY [0]
RAPL PL 2 Enable [Disabled]
RAPL PL 2 Power [222]
RAPL PL 2 WindowX [1]
RAPL PL 2 WindowY [10]
Lock RAPL Limit register. (Disable as default).
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
RAPL Power Floor Channel 0 (Note1)	0,1,...**255**	Power budget. Range [255;0], 0 = 5.3Watt as default.
RAPL Power Floor Channel 1 (Note1)	0,1,...**255**	Power budget. Range [255;0], 0 = 5.3Watt as default.
RAPL PL Lock	**Disabled** Enabled	Lock RAPL Limit register. (Disable as default).
RAPL PL 1 Enable	**Disabled** Enabled	Enable/Disable RAPL Power Limit 1.
RAPL PL 1 Power	**0**,1,...2047	Power Limit 1 for DDR domain. Range [0 – 2047] = [0 – 2047.875] in Watt.
RAPL PL 1 WindowX	**0**,1,2,3	Power Limit 1 time window X value for DDR domain. Actual time_window for RAPL is: (1/1024 seconds) * (1+(x/4)) * (2^y).
RAPL PL 1 WindowY	**0**,1,...31	Power Limit 1 time window Y value for DDR domain. Actual time_window for RAPL is: (1/1024 seconds) * (1+(x/4)) * (2^y).
RAPL PL 2 Enable	**Disabled** Enabled	Enable/Disable RAPL Power Limit 2.
RAPL PL 2 Power	**0**,1,...2047	Power Limit 2 for DDR domain. Range [0 – 2047] = [0 – 2047.875] in Watt.
RAPL PL 2 WindowX	0,**1**,2,3	Power Limit 2 time window X value for DDR domain. Actual time_window for RAPL is: (1/1024 seconds) * (1+(x/4)) * (2^y).
RAPL PL 2 WindowY	0,1,...,**10**,...31	Power Limit 2 time window Y value for DDR domain. Actual time_window for RAPL is: (1/1024 seconds) * (1+(x/4)) * (2^y).

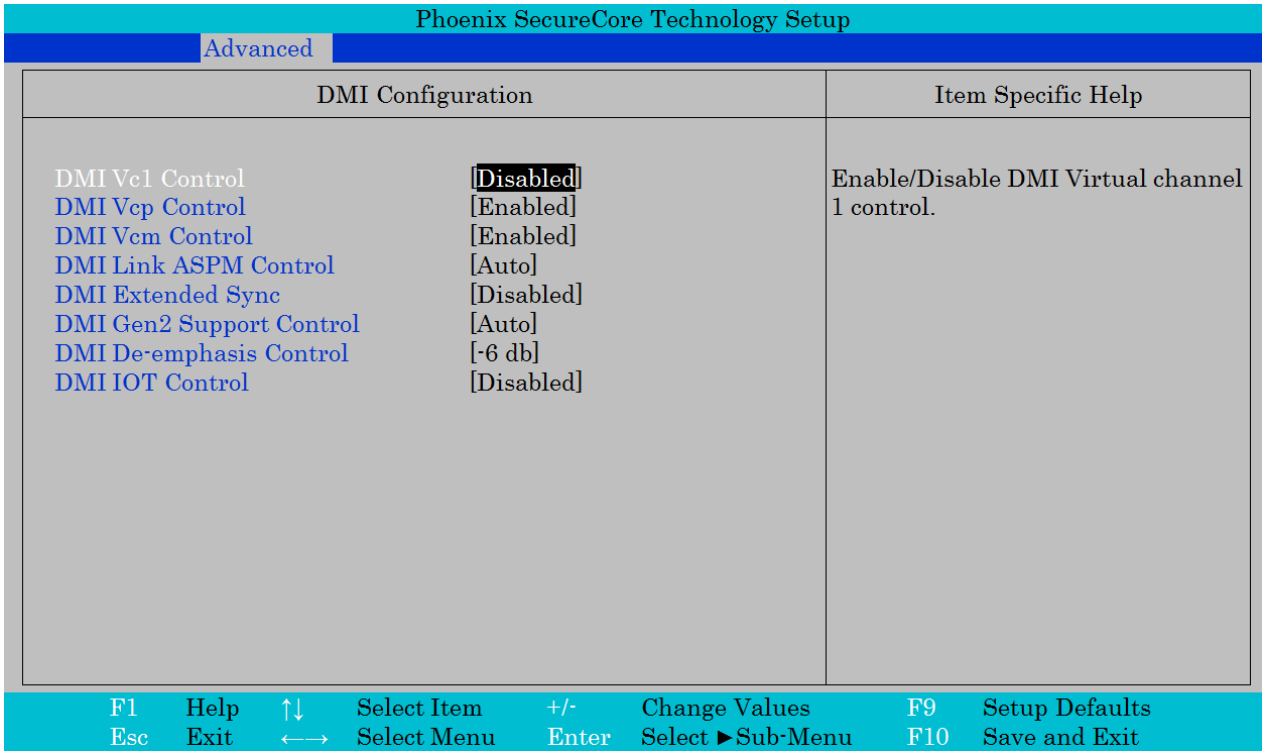
Note1: Only selectable if "Dram Power Meter" > "Use User provided power weights, scale factor" is Enabled.

System Agent (SA) Configuration


Phoenix SecureCore Technology Setup
Advanced
System Agent (SA) Configuration
Item Specific Help
▶ DMI Settings
▶ Intel ® VT for Directed I/O (VT-d)
▶ Graphics Configuration
▶ PEG Port Configuration
Cpu Audio Device (D0:D3:F0) [Enabled]
CHAP Device [D0:D4:F0) [Disabled]
Thermal Device [D0:D4:F0) [Disabled]
CRID support [Disabled]
Displays and provides option to change the DMI Settings.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

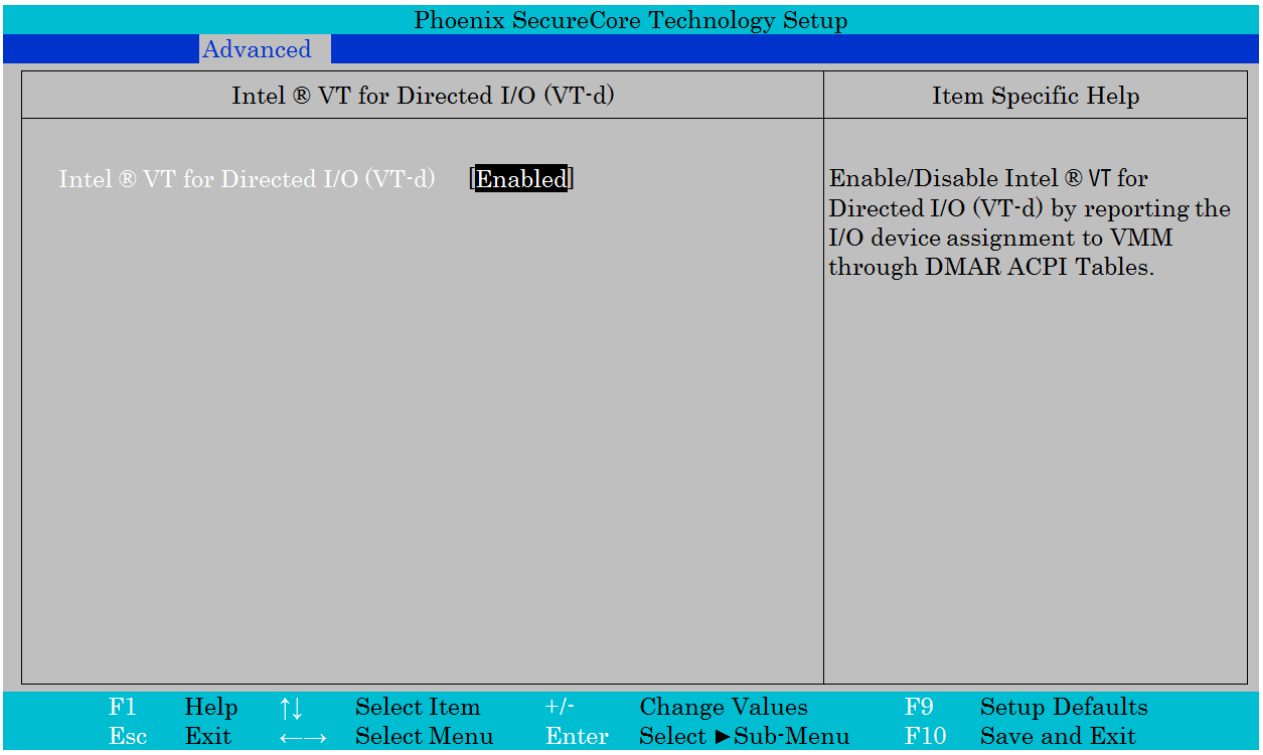
Function	Selection	Description
Cpu Audio Device (D0:D3:F0)	Disabled **Enabled**	Enable/Disable Cpu Audio Device.
CHAP Device [D0:D4:F0)	**Disabled** Enabled	Enable/Disable SA CHAP Device.
Thermal Device [D0:D4:F0)	**Disabled** Enabled	Enable/Disable SA Thermal Device.
CRID support	**Disabled** Enabled	Enable Compatible Revision ID.

DMI Settings


Phoenix SecureCore Technology Setup
Advanced
DMI Configuration
Item Specific Help
DMI Vc1 Control [Disabled]
DMI Vcp Control [Enabled]
DMI Vcm Control [Enabled]
DMI Link ASPM Control [Auto]
DMI Extended Sync [Disabled]
DMI Gen2 Support Control [Auto]
DMI De-emphasis Control [-6 db]
DMI IOT Control [Disabled]
Enable/Disable DMI Virtual channel 1 control.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

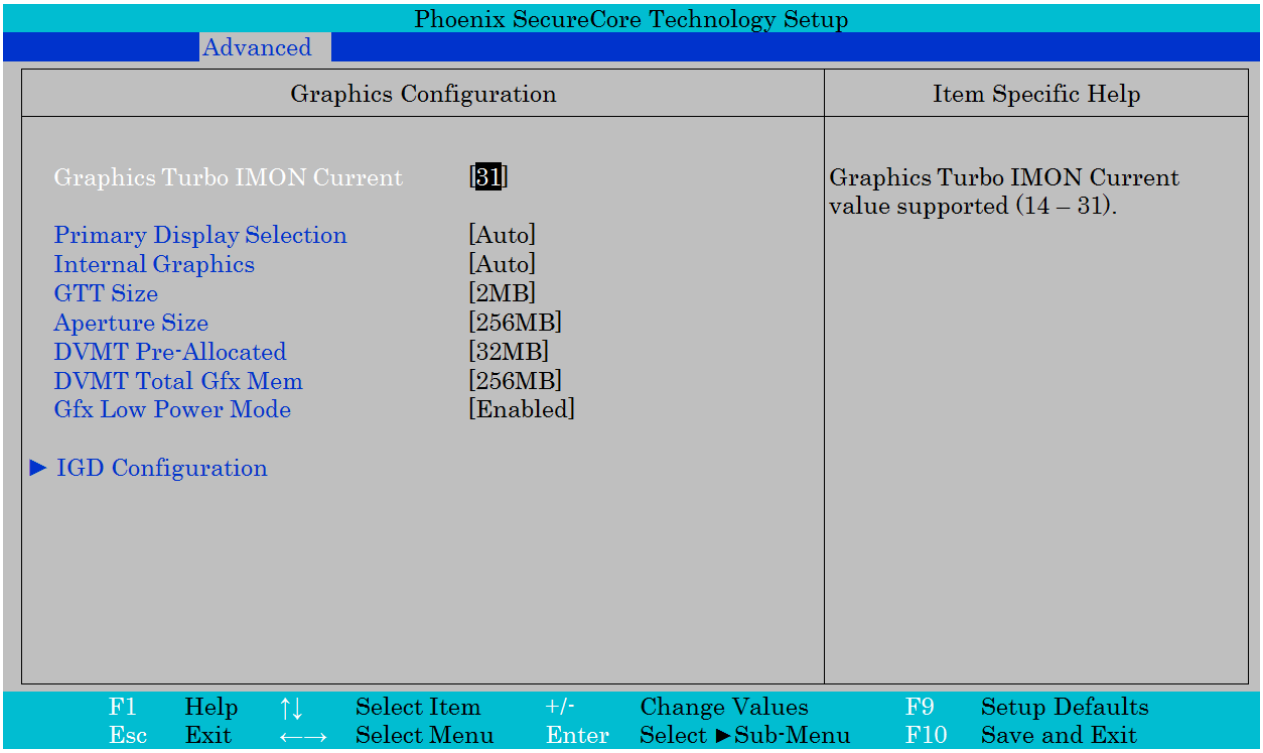
Function	Selection	Description
DMI Vc1 Control	**Disabled** Enabled	Enable/Disable DMI Virtual channel 1 control.
DMI Vcp Control	Disabled **Enabled**	Enable/Disable DMI Virtual channel P control.
DMI Vcm Control	Disabled **Enabled**	Enable/Disable DMI Virtual channel M control.
DMI Link ASPM Control	Disabled L0S L1 L0S And L1 **Auto**	Enable/Disable the control of Active State Power Management on SA side of the DMI Link.
DMI Extended Sync	**Disabled** Enabled	Enable/Disable DMI Extend Sync control.
DMI Gen2 Support Control	Disabled Enabled **Auto**	Enable/Disable DMI Gen2 Support Control.
DMI De-emphasis Control	**-6 dB** -3.5 dB	DeEmphasis Control for DMI.
DMI IOT Control	**Disabled** Enabled	IOT Control for DMI.

Intel ® VT for Directed I/O (VT-d)


Phoenix SecureCore Technology Setup
Advanced
Intel ® VT for Directed I/O (VT-d)
Item Specific Help
Intel ® VT for Directed I/O (VT-d) [Enabled]
Enable/Disable Intel ® VT for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

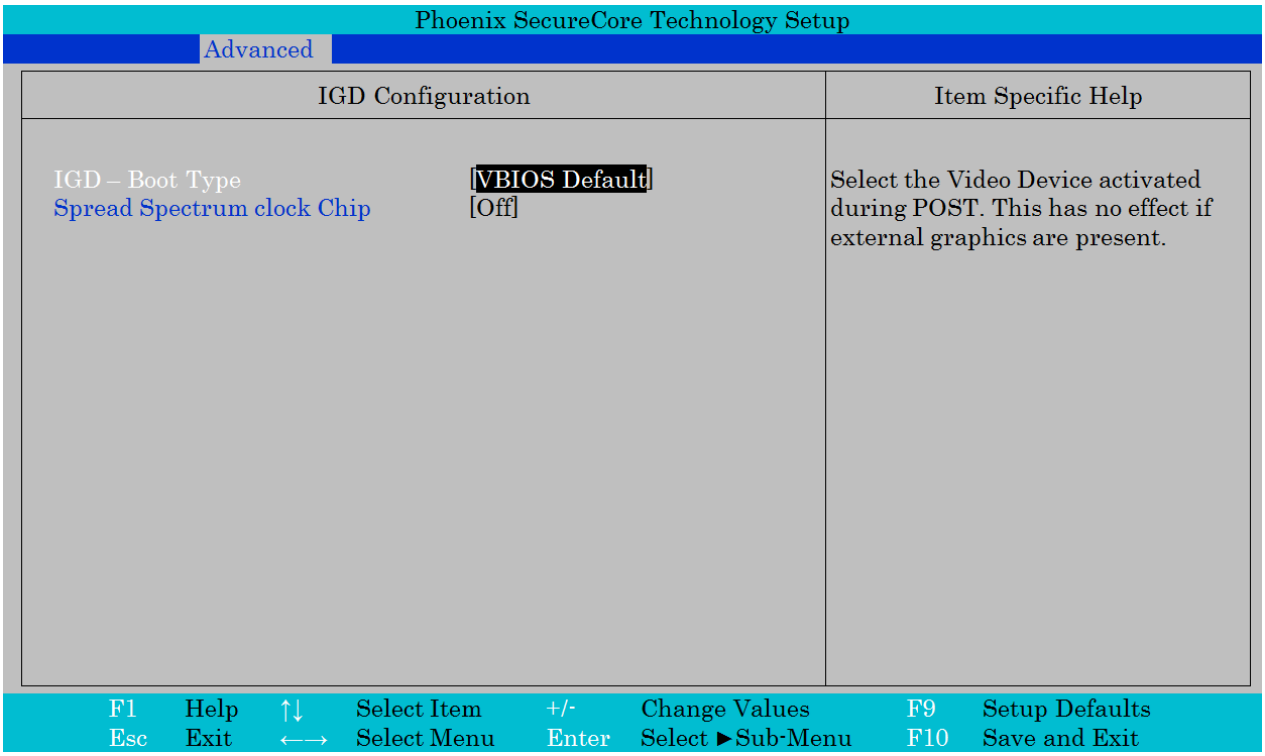
Function	Selection	Description
Intel ® VT for Directed I/O (VT-d)	Disabled **Enabled**	Enable/Disable Intel ® VT for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables.

Graphics Configuration


Phoenix SecureCore Technology Setup
Advanced
Graphics Configuration
Item Specific Help
Graphics Turbo IMON Current [31]
Graphics Turbo IMON Current value supported (14 – 31).
Primary Display Selection [Auto]
Internal Graphics [Auto]
GTT Size [2MB]
Aperture Size [256MB]
DVMT Pre-Allocated [32MB]
DVMT Total Gfx Mem [256MB]
Gfx Low Power Mode [Enabled]
▶ IGD Configuration
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

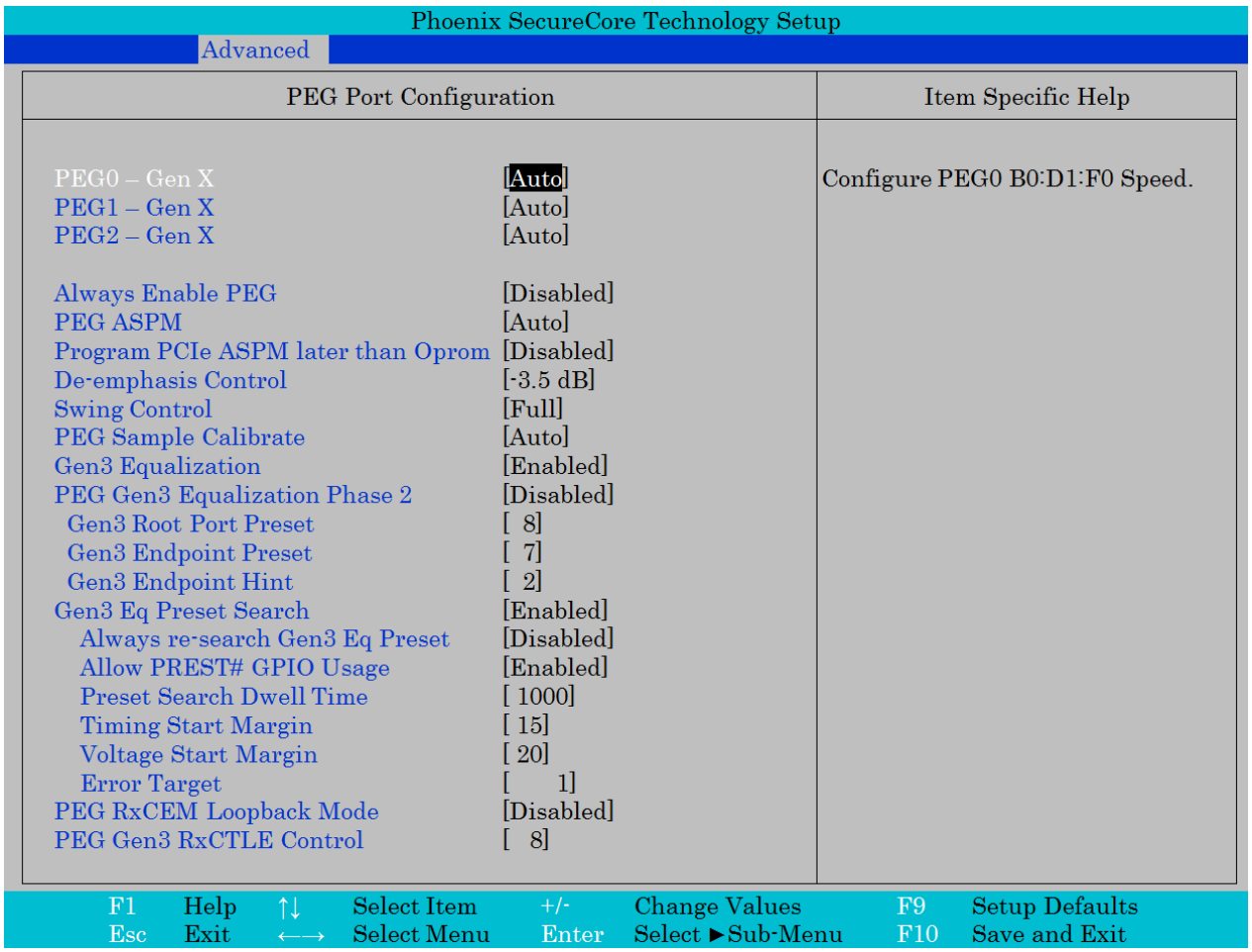
Function	Selection	Description
Graphics Turbo IMON Current	14, 15,... 30, **31**	Graphics Turbo IMON Current value supported (14 – 31).
Primary Display Selection	IGD PEG **Auto**	Select the primary display device.
Internal Graphics	Disabled Enabled **Auto**	Enable/Disable the Internal Graphics Device. This has no effect if external graphics are present.
GTT Size	1MB **2MB**	Gtt Memory Size of IGD.
Aperture Size	128MB **256MB** 512MB	Graphics Aperture Size.
DVMT Pre-Allocated	**32MB** 64MB 128MB	Select Pre-Allocated Graphics Memory size used by the Internal Graphics Device. This has no effect if external graphics are present.
DVMT Total Gfx Mem	128MB **256MB** MAX	DVMT5.0 DVMT Graphic Memory Size. This has no effect if external graphics are present.
Gfx Low Power Mode	Disabled **Enabled**	Enable/Disable Gfx Low Power Mode.

IGD Configuration


Phoenix SecureCore Technology Setup
Advanced
IGD Configuration
Item Specific Help
IGD – Boot Type
[VBIOS Default]
Spread Spectrum clock Chip
[Off]
Select the Video Device activated during POST. This has no effect if external graphics are present.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

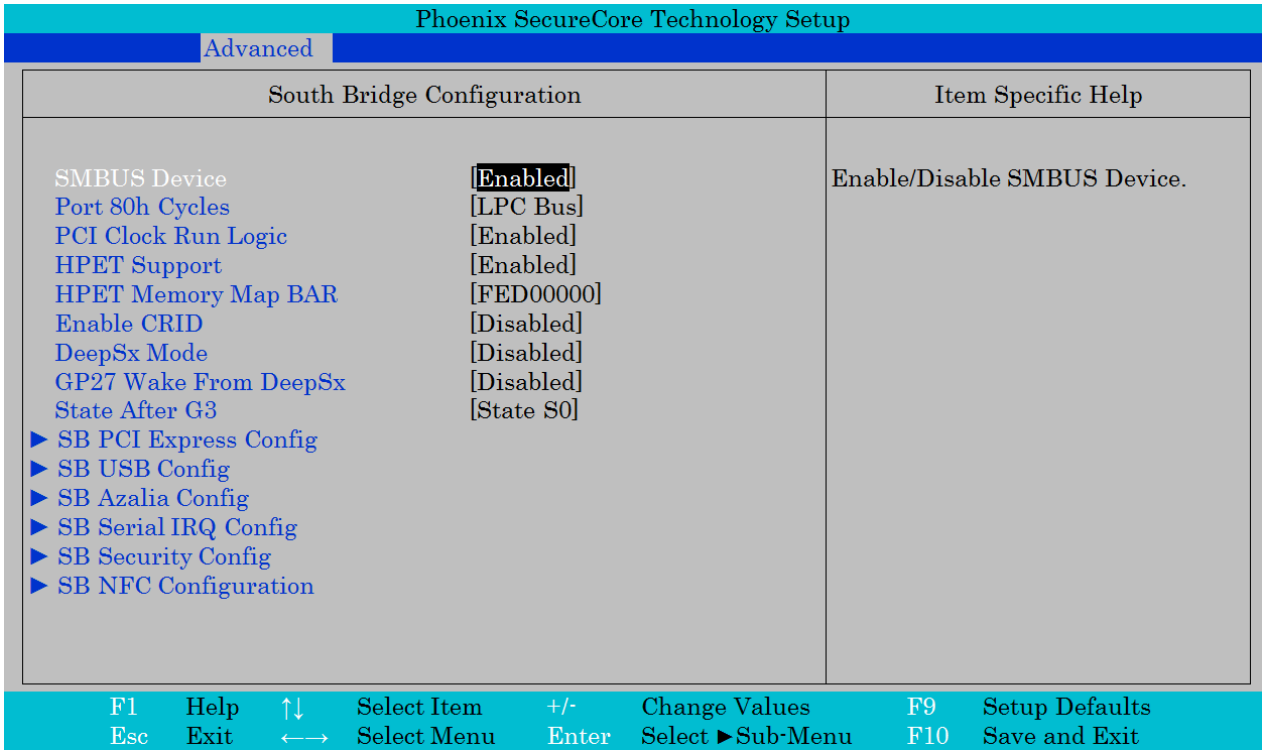
Function	Selection	Description
IGD – Boot Type	**VBIOS Default** CRT EFP LFP EFP3 EFP2 LFP2	Select the Video Device activated during POST. This has no effect if external graphics are present.
Spread Spectrum clock Chip	**Off** Hardware Software	Hardware: Spread is controlled by chip. Software: Spread is controlled by BIOS.

PEG Port Configuration


Phoenix SecureCore Technology Setup
Advanced
PEG Port Configuration
Item Specific Help
PEG0 – Gen X [Auto]
PEG1 – Gen X [Auto]
PEG2 – Gen X [Auto]
Always Enable PEG [Disabled]
PEG ASPM [Auto]
Program PCIe ASPM later than Oprom [Disabled]
De-emphasis Control [-3.5 dB]
Swing Control [Full]
PEG Sample Calibrate [Auto]
Gen3 Equalization [Enabled]
PEG Gen3 Equalization Phase 2 [Disabled]
Gen3 Root Port Preset [8]
Gen3 Endpoint Preset [7]
Gen3 Endpoint Hint [2]
Gen3 Eq Preset Search [Enabled]
Always re-search Gen3 Eq Preset [Disabled]
Allow PREST# GPIO Usage [Enabled]
Preset Search Dwell Time [1000]
Timing Start Margin [15]
Voltage Start Margin [20]
Error Target [1]
PEG RxCEM Loopback Mode [Disabled]
PEG Gen3 RxCTLE Control [8]
Configure PEG0 B0:D1:F0 Speed.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

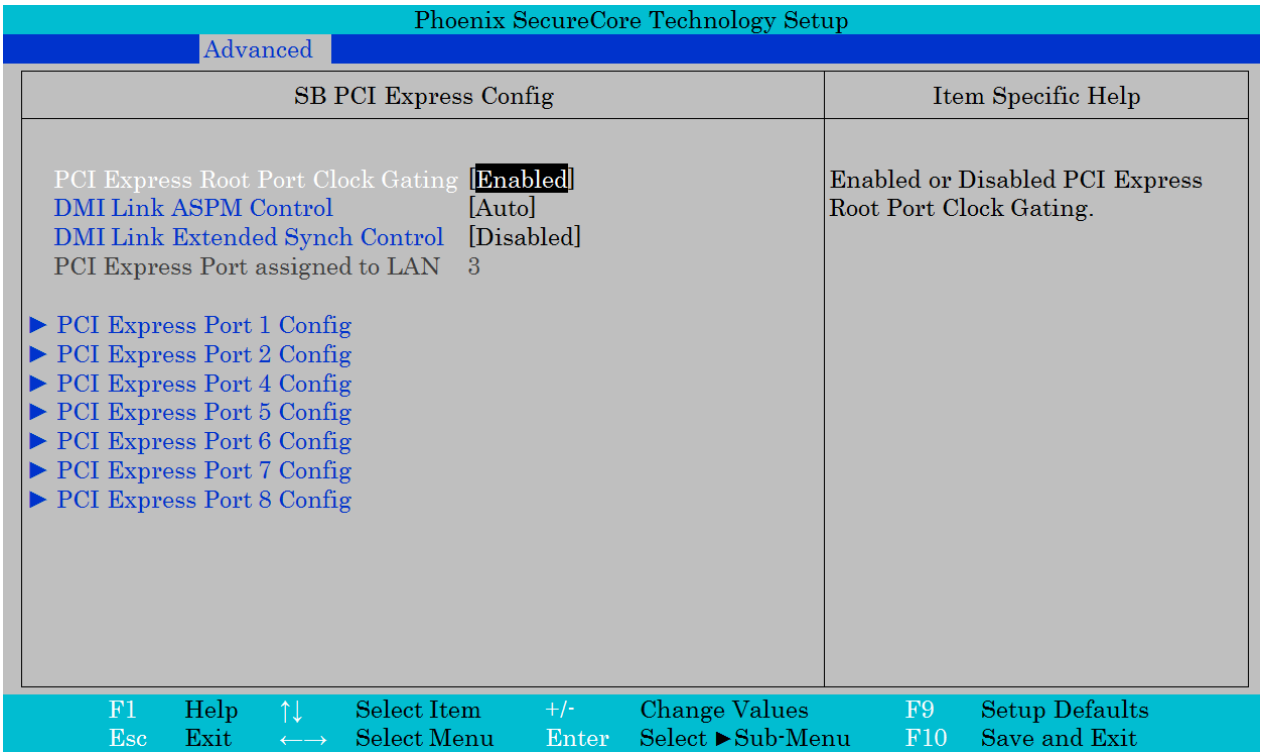
Function	Selection	Description
PEG0 – Gen X	**Auto** Gen1 Gen2 Gen3	Configure PEG0 B0:D1:F0 Speed.
PEG1 – Gen X	**Auto** Gen1 Gen2 Gen3	Configure PEG1 B0:D1:F1 Speed.
PEG2 – Gen X	**Auto** Gen1 Gen2 Gen3	Configure PEG2 B0:D1:F2 Speed.
Always Enable PEG	**Disabled** Enabled	Enable PEG.
PEG ASPM	Disabled L0S L1 L0S And L1 **Auto**	PEG ASPM Settings.
Program PCIe ASPM later than Oprom	**Disabled** Enabled	Enabled: PCIe ASPM will be programmed after OpROM. Disabled: PCIe ASPM will be programmed before OpROM
De-emphasis Control	-6 dB **-3.5 dB**	DeEmphasis control for PEG.
Swing Control	Reduced Half **Full**	Perform PEG Swing Control.
PEG Sample Calibrate	Disabled Enabled **Auto**	Enable/Disable PEG Sample Calibrate.
Gen3 Equalization	Disabled **Enabled**	Perform PEG Gen3 Equalization steps.
PEG Gen3 Equalization Phase2	**Disabled** Enabled	Enable/Disable PEG Gen3 Equalization Phase2.
Gen3 Root Port Preset	1,2,...**8**,...11	Root Port Preset value for Gen3 Equalization.
Gen3 Endpoint Preset	0,1,...**7**,...10	Endpoint Preset value for Gen3 Equalization.
Gen3 Endpoint Hint	0,1,**2**,...10	Endpoint Hint value for Gen3 Equalization.
Gen3 Eq Preset Search	Disabled **Enabled**	Perform PEG Gen3 SW Preset Search algorithm.
Always re-search Gen3 Eq Preset	**Disabled** Enabled	Always re-search PEG Gen3 Preset even it has been done once.
Allow PREST# GPIO Usage	Disabled **Enabled**	Enable/Disable GPIO-based resets to PEG endpoint(s) during margin search, if needed.
Preset Search Dwell Time	0,...**1000**, ...65535	PEG Gen3 Preset Search dwell time in [ms].
Timing Start Margin	4, ...**15**, ...255	The starting value [4...255] for the backward margin search.
Voltage Start Margin	4, ...**20**, ...255	The starting value [4...255] for the backward margin search.
Error Target	0,**1**, ...65535	The margin search error target value [1 ... 65535].
PEG RxCEM Loopback Mode	**Disabled** Enabled	Enable/Disable PEG RxCEM Loopback Mode.
PEG Gen3 RxCTLE Control	0, ...**8**, ...255	PEG Gen3 RxCTLE for Bundle0(Lane0, Lane1).

South Bridge Configuration


Phoenix SecureCore Technology Setup
Advanced
South Bridge Configuration
Item Specific Help
SMBUS Device [Enabled]
Port 80h Cycles [LPC Bus]
PCI Clock Run Logic [Enabled]
HPET Support [Enabled]
HPET Memory Map BAR [FED00000]
Enable CRID [Disabled]
DeepSx Mode [Disabled]
GP27 Wake From DeepSx [Disabled]
State After G3 [State S0]
▶ SB PCI Express Config
▶ SB USB Config
▶ SB Azalia Config
▶ SB Serial IRQ Config
▶ SB Security Config
▶ SB NFC Configuration
Enable/Disable SMBUS Device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

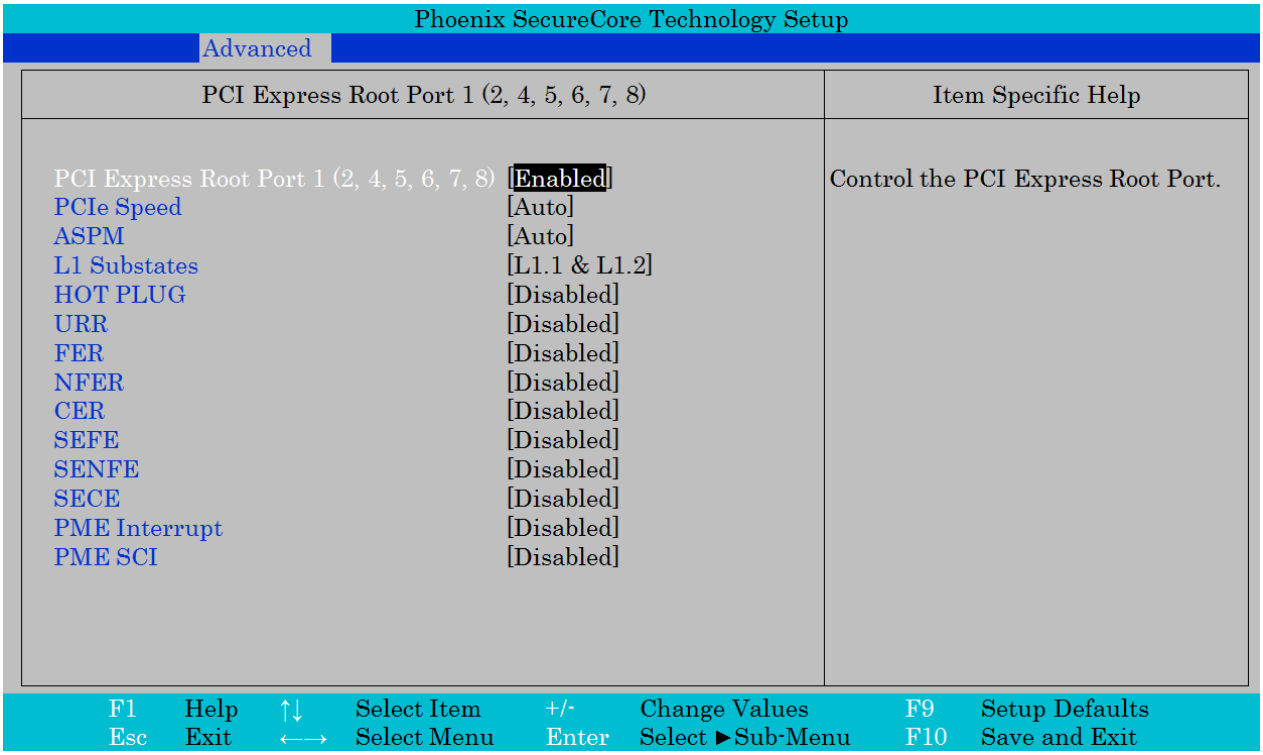
Function	Selection	Description
SMBUS Device	Disabled **Enabled**	Enable/Disable SMBUS Device.
Port 80h Cycles	**LPC Bus** PCI Bus	Control where the Port 80h cycles are sent.
PCI Clock Run Logic	Disabled **Enabled**	Controls PCIe clock gate power saving feature.
HPET Support	Disabled **Enabled**	Control the High Precision Event Timer through this setup option. When enabled, the RSDT points to the HPET table and the proper enable bits are set.
HPET Memory Map BAR	**FED00000** FED01000 FED02000 FED03000	Select the HPET Memory Map Base Address.
Enable CRID	**Disabled** Enabled	Enable Compatible Revision ID.
DeepSx Mode	**Disabled** Enabled only in S5/Battery Enabled only in S4-S5/Battery Enabled in S3-S5/Battery	Configure the DeepSx Mode configuration.
GP27 Wake From DeepSx	**Disabled** Enabled	Wake From DeepSx by the assertion of GP27 pin.
State After G3	State S5 **State S0**	Specify what state to switch to when power is re-applied after a power failure (G3 state).

SB PCI Express Config


Phoenix SecureCore Technology Setup
Advanced
SB PCI Express Config
Item Specific Help
PCI Express Root Port Clock Gating [Enabled]
DMI Link ASPM Control [Auto]
DMI Link Extended Synch Control [Disabled]
PCI Express Port assigned to LAN 3
Enabled or Disabled PCI Express Root Port Clock Gating.
▶ PCI Express Port 1 Config
▶ PCI Express Port 2 Config
▶ PCI Express Port 4 Config
▶ PCI Express Port 5 Config
▶ PCI Express Port 6 Config
▶ PCI Express Port 7 Config
▶ PCI Express Port 8 Config
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
PCI Express Root Port Clock Gating	Disabled **Enabled**	Enabled or Disabled PCI Express Root Port Clock Gating.
DMI Link ASPM Control	Disabled L0S L1 L0S And L1 **Auto**	The control of Active State Power Management of the DMI Link.
DMI Link Extended Synch Control	**Disabled** Enabled	The control of Extended Sync on SB side of the DMI Link.

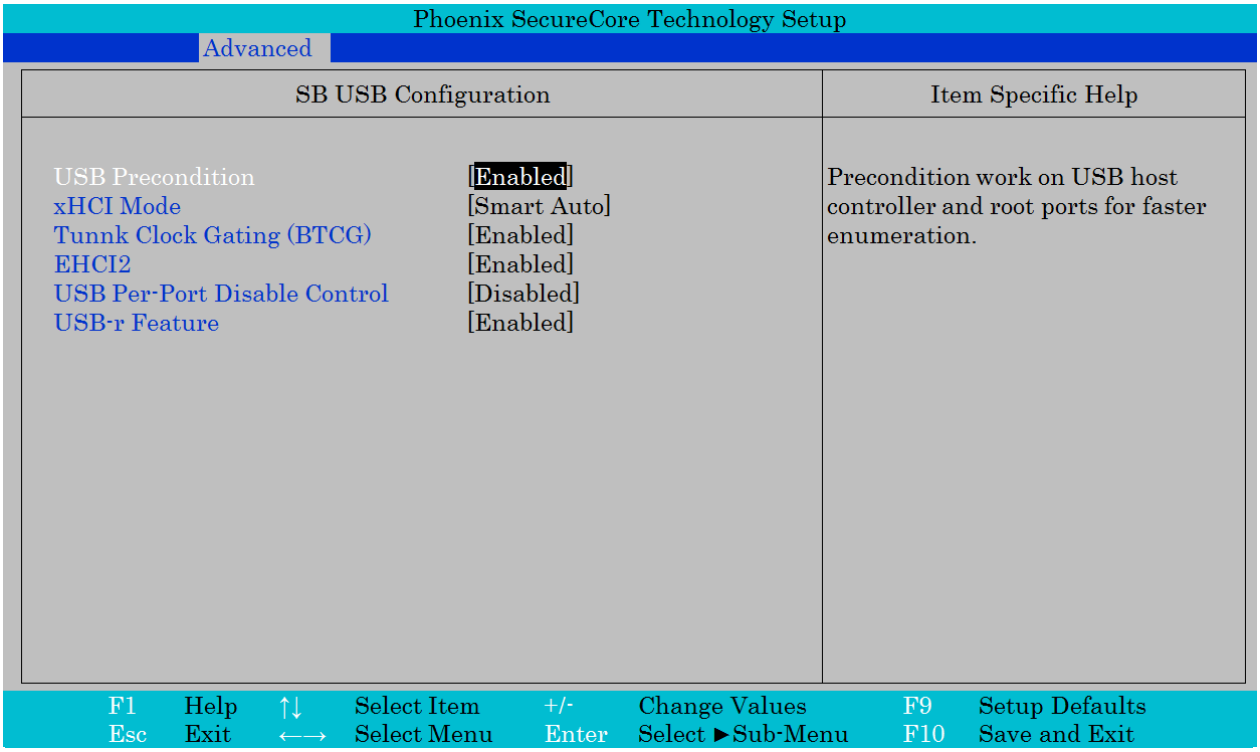
PCI Express Root Port 1 (2, 4, 5, 6, 7, 8)


Phoenix SecureCore Technology Setup
Advanced
PCI Express Root Port 1 (2, 4, 5, 6, 7, 8)
Item Specific Help
PCI Express Root Port 1 (2, 4, 5, 6, 7, 8) [Enabled]
PCIe Speed [Auto]
ASPM [Auto]
L1 Substates [L1.1 & L1.2]
HOT PLUG [Disabled]
URR [Disabled]
FER [Disabled]
NFER [Disabled]
CER [Disabled]
SEFE [Disabled]
SENFE [Disabled]
SECE [Disabled]
PME Interrupt [Disabled]
PME SCI [Disabled]
Control the PCI Express Root Port.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
PCI Express Root Port x (x= 1, 2, 4, 5, 6, 7, 8)	Disabled **Enabled**	Control the PCI Express Root Port.
PCIe Speed	**Auto** Gen1 Gen2	Select PCIe Speed to Gen1 or Gen2.
ASPM	Disabled L0S L1 L0S And L1 **Auto**	Control PCIe Active State Power Management settings.
L1 Substates	Disabled L1.1 L1.2 **L1.1 & L1.2**	PCI Express L1 Substates setting.
HOT PLUG	**Disabled** Enabled	PCI Express Hot Plug Enabled/Disabled.
URR	**Disabled** Enabled	PCI Express Unsupported Request Reporting Enabled/Disabled.
FER	**Disabled** Enabled	PCI Express Device Fatal Error Reporting Enabled/Disabled.
NFER	**Disabled** Enabled	PCI Express Device Non-Fatal Error Reporting Enabled/Disabled.
CER	**Disabled** Enabled	PCI Express Device Correctable Error Reporting Enabled/Disabled.
SEFE	**Disabled** Enabled	Root PCI Express System Error on Fatal Error Enabled/Disabled.
SENFE	**Disabled** Enabled	R oot PCI Express System Error on Non-Fatal Error Enabled/Disabled.
SECE	**Disabled** Enabled	Root PCI Express System Error on Correctable Error Enabled/Disabled.
PME Interrupt	**Disabled** Enabled	Root PCI Express PME Interrupt Enabled/Disabled.
PME SCI	Disabled Enabled (Note1)	PCI Express PME SCI Enabled/Disabled.

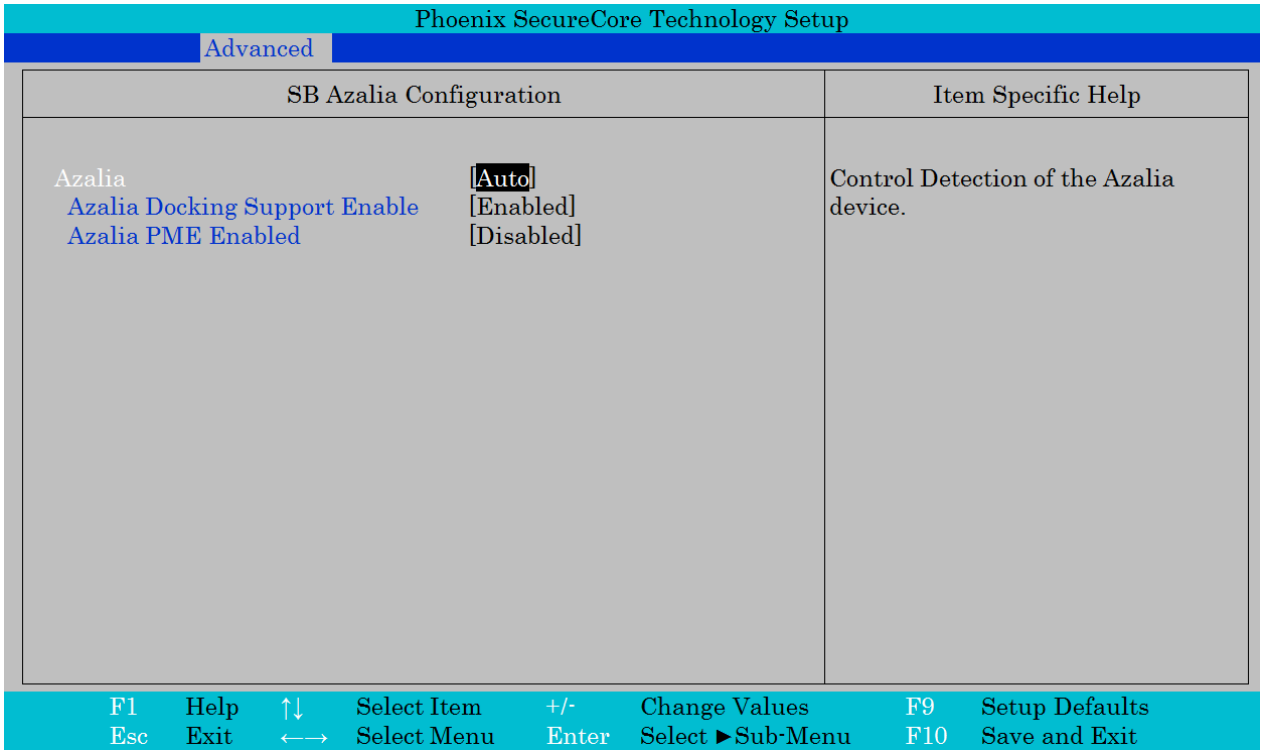
Note 1: Default is “Disabled” for port 1, 2, 4 and 8 and “Enabled” for port 5, 6 and 7.

SB USB Configuration


Phoenix SecureCore Technology Setup
Advanced
SB USB Configuration
Item Specific Help
USB Precondition [Enabled]
xHCI Mode [Smart Auto]
Tunnk Clock Gating (BTCG) [Enabled]
EHCI2 [Enabled]
USB Per-Port Disable Control [Disabled]
USB-r Feature [Enabled]
Precondition work on USB host controller and root ports for faster enumeration.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

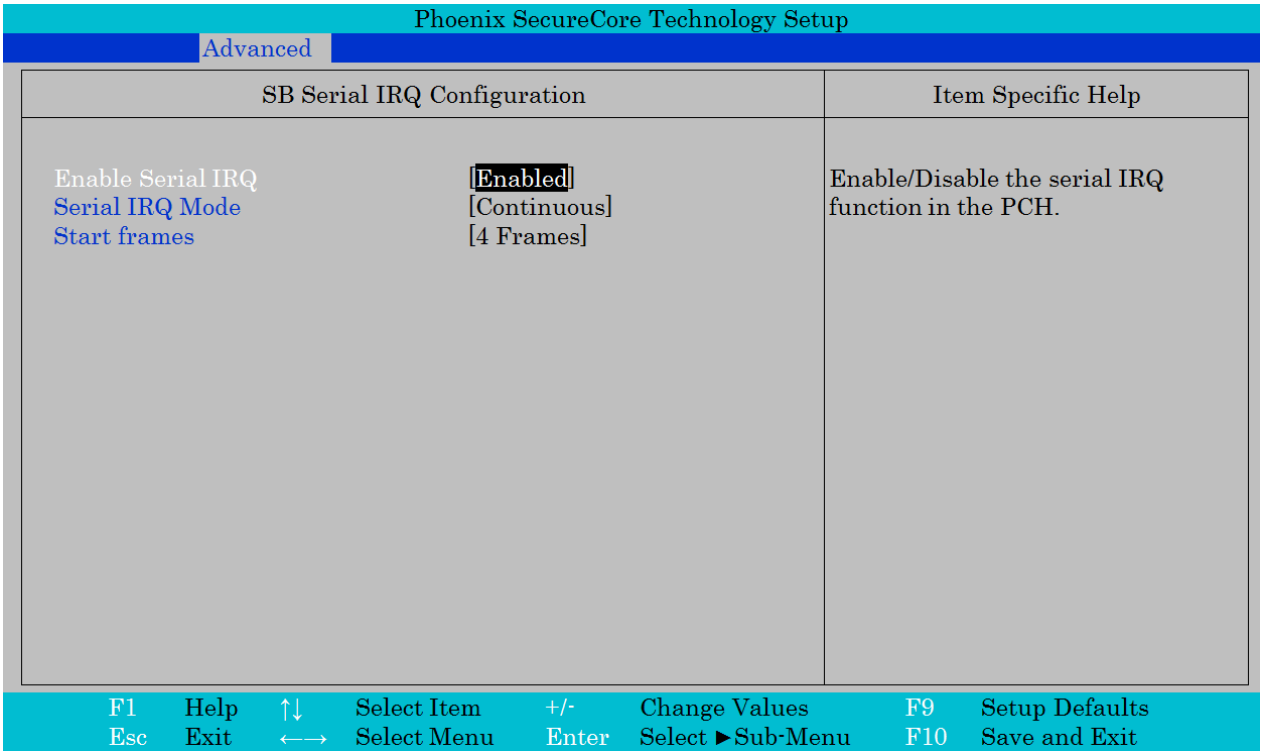
Function	Selection	Description
USB Precondition	Disabled **Enabled**	Precondition work on USB host controller and root ports for faster enumeration.
xHCI Mode	Disabled Enabled Auto **Smart Auto**	Mode of operation of xHCI controller.
Tunnk Clock Gating (BTCG)	Disabled **Enabled**	Enabled/Disabled BTCG.
EHCI2	Disabled **Enabled**	Control the USB EHCI (USB 2.0) functions.
USB Per-Port Disable Control	**Disabled** Enabled	Control each of the USB ports (0~13) enable/disable.
USB-r Feature	Disabled **Enabled**	Enable/Disable support for the USB-r redirect device on the EHCI controller.

SB Azalia Configuration


Phoenix SecureCore Technology Setup
Advanced
SB Azalia Configuration
Item Specific Help
Azalia [Auto]
Azalia Docking Support Enable [Enabled]
Azalia PME Enabled [Disabled]
Control Detection of the Azalia device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

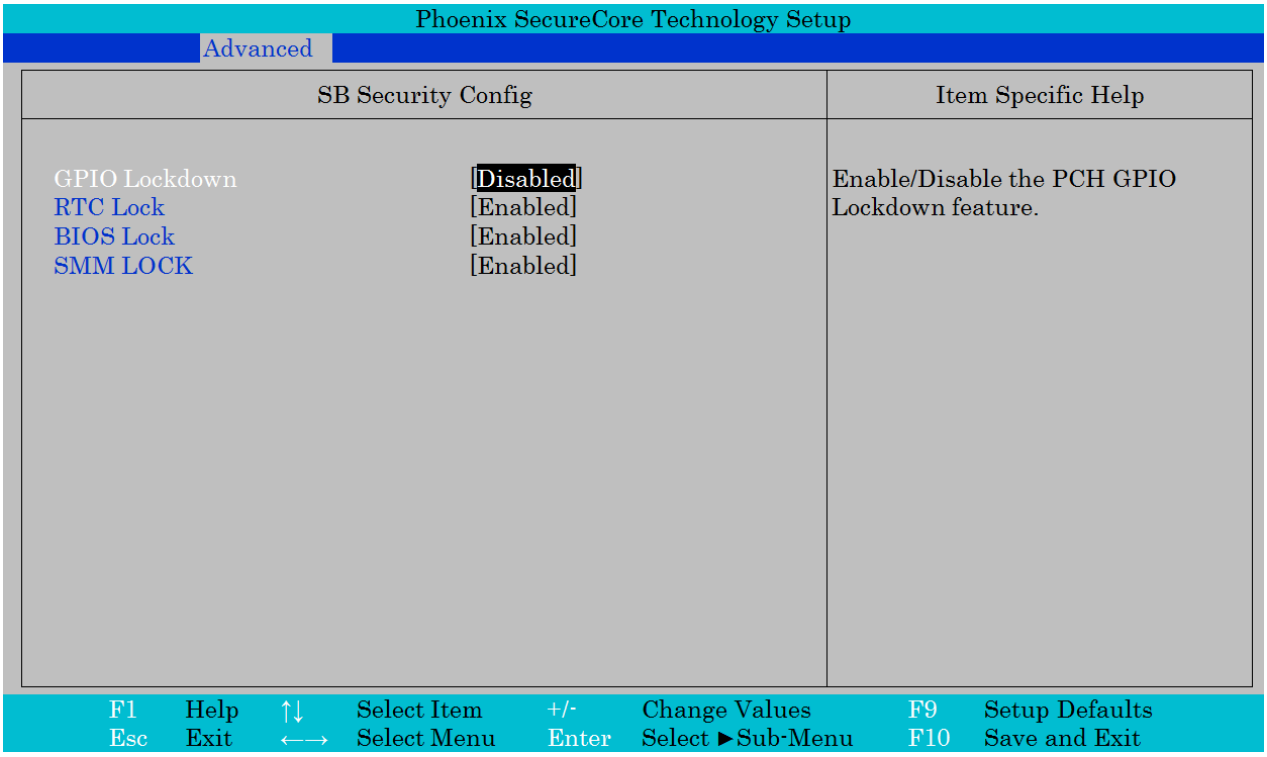
Function	Selection	Description
Azalia	Disabled Enabled **Auto**	Control Detection of the Azalia device.
Azalia Docking Support Enable	Disabled **Enabled**	Enable/Disable Docking Support for Azalia.
Azalia PME Enabled	**Disabled** Enabled	Enable/Disable PME for Azalia.

SB Serial IRQ Configuration


Phoenix SecureCore Technology Setup
Advanced
SB Serial IRQ Configuration
Item Specific Help
Enable Serial IRQ
[Enabled]
Serial IRQ Mode
[Continuous]
Start frames
[4 Frames]
Enable/Disable the serial IRQ function in the PCH.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

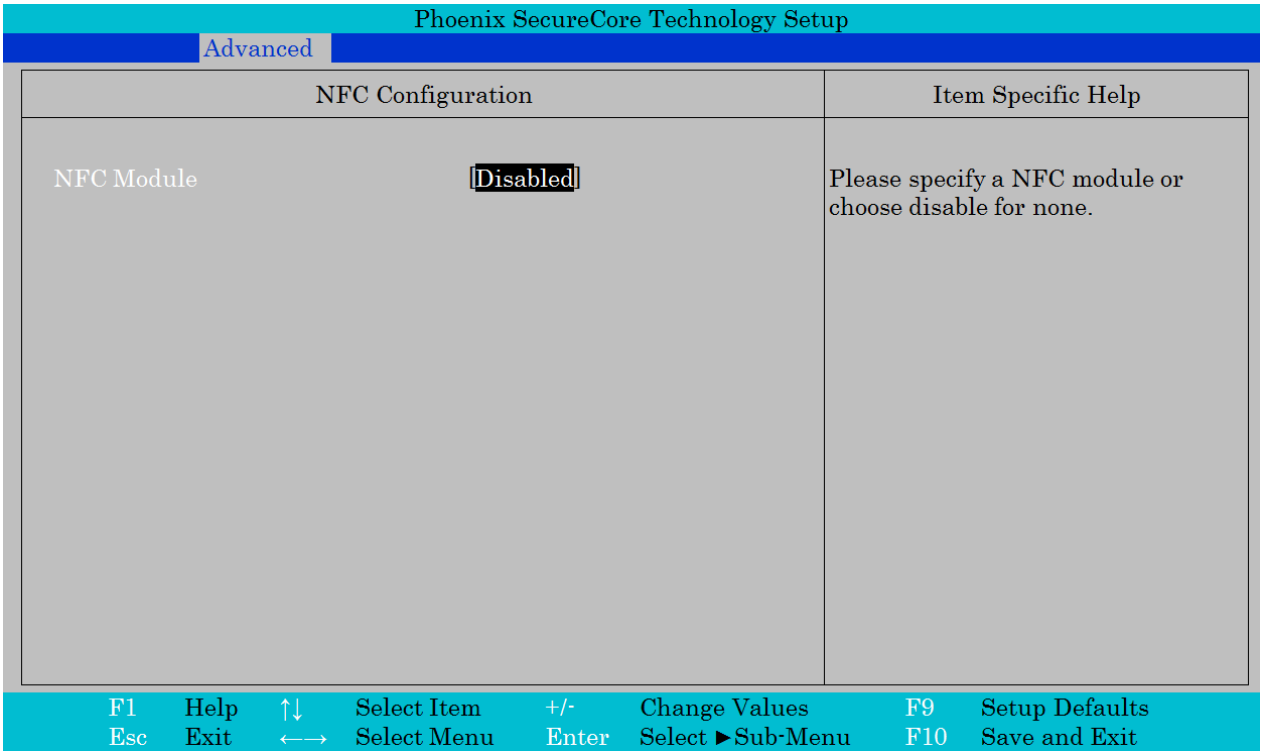
Function	Selection	Description
Enable Serial IRQ	Disabled **Enabled**	Enable/Disable the serial IRQ function in the PCH.
Serial IRQ Mode	Quiet **Continuous**	The “Quit” mode Serial IRQ is active only when needed, In “Continuous” it is active all the time.
Start frames	**4 Frames** 6 Frames 8 Frames	The number of start frames at the beginning of the serial IRQ.

SB Security Config



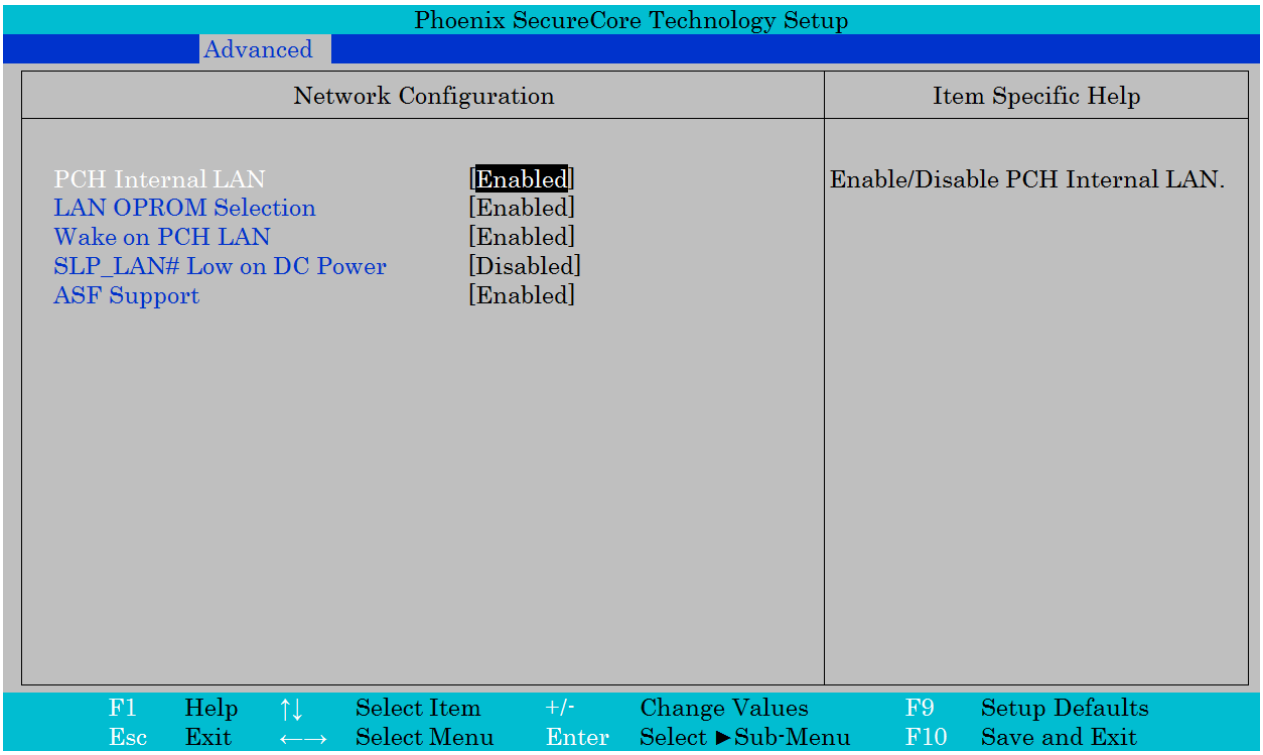
Function	Selection	Description
GPIO Lockdown	**Disabled** Enabled	Enable/Disable the PCH GPIO Lockdown feature.
RTC Lock	Disabled **Enabled**	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
BIOS Lock	Disabled **Enabled**	Enable/Disable the PCH BIOS Lock Enable feature. The whole BIOS region is not writable.
SMM LOCK	Disabled **Enabled**	Enable/Disable SMM LOCK feature. It will lock the SMRAM and unable load SMM driver any more.

SB NFC Configuration


Phoenix SecureCore Technology Setup
Advanced
NFC Configuration
Item Specific Help
NFC Module
[Disabled]
Please specify a NFC module or choose disable for none.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

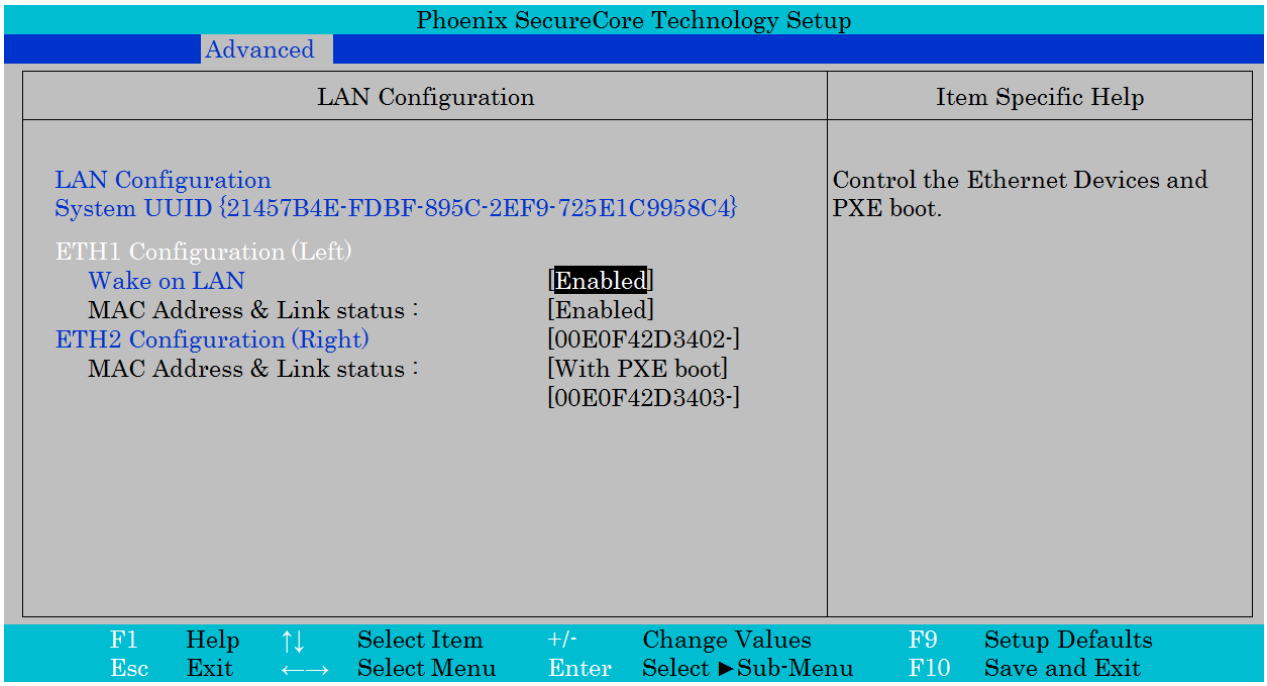
Function	Selection	Description
NFC Module	**Disabled** Enabled	Please specify a NFC module or choose disable for none.

Network Configuration


Phoenix SecureCore Technology Setup
Advanced
Network Configuration
Item Specific Help
PCH Internal LAN [Enabled]
LAN OPROM Selection [Enabled]
Wake on PCH LAN [Enabled]
SLP_LAN# Low on DC Power [Disabled]
ASF Support [Enabled]
Enable/Disable PCH Internal LAN.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
PCH Internal LAN	Disabled **Enabled**	Enable/Disable PCH Internal LAN.
LAN OPROM Selection	Disabled **Enabled**	This is used to select LAN OPROM for quick boot minimal configuration.
Wake on PCH LAN	Disabled **Enabled**	Enable PCH Internal Wake on LAN capability at Moff.
SLP_LAN# Low on DC Power	**Disabled** Enabled	Enable/Disable SLP_LAN# Low on DC Power.
ASF Support	Disabled **Enabled**	Enable/Disable Alert Specification Format.

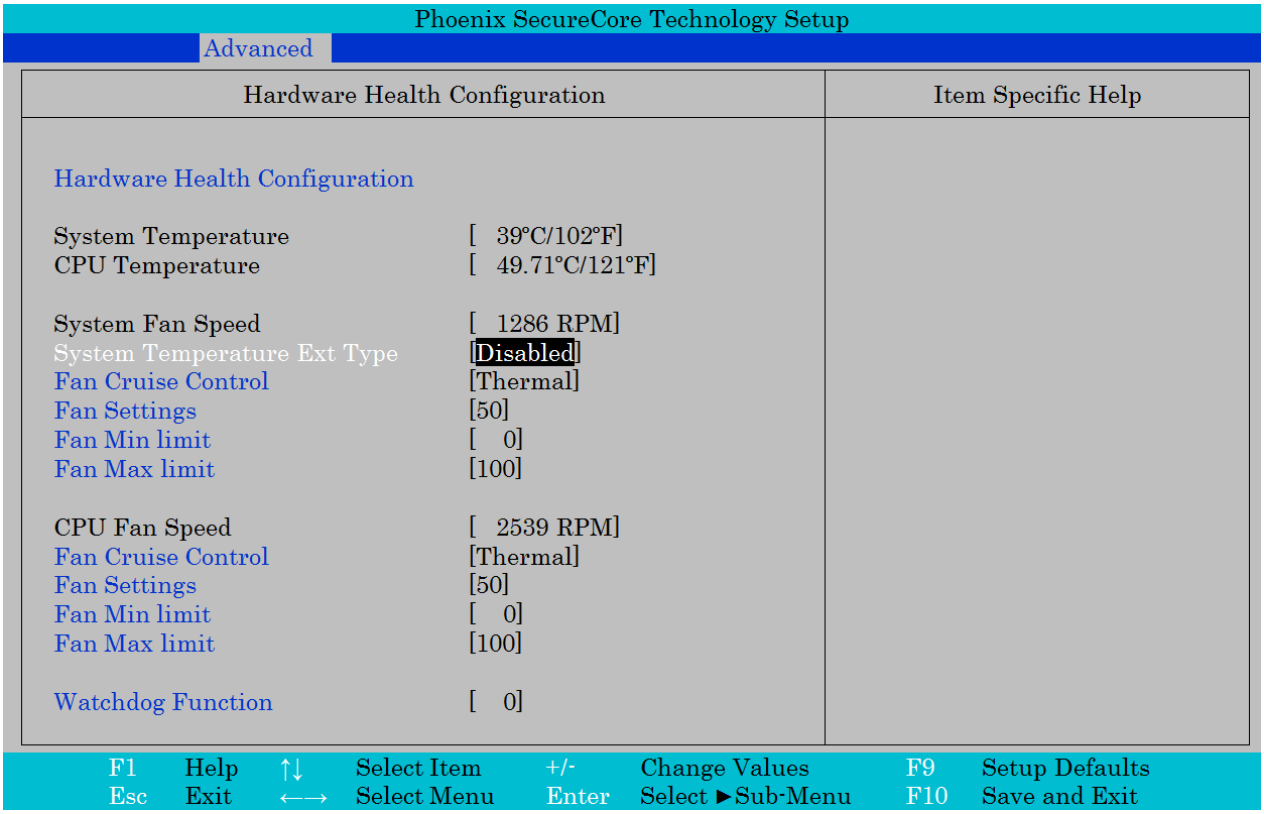
LAN Configuration



Note: The "+" and "-" (to the right of the MAC address) indicates respectively if link is established or not.

Function	Selection	Description
ETH1 Configuration (Left)	Disabled **Enabled** With PXE boot	Control the Ethernet Devices and PXE boot.
Wake on LAN	Disabled **Enabled**	Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state).
ETH2 Configuration (Right)	Disabled **Enabled** With PXE boot	Control the Ethernet Devices and PXE boot.

Hardware Health Configuration


Phoenix SecureCore Technology Setup
Advanced
Hardware Health Configuration
Item Specific Help
Hardware Health Configuration
System Temperature [39°C/102°F]
CPU Temperature [49.71°C/121°F]
System Fan Speed [1286 RPM]
System Temperature Ext Type [Disabled]
Fan Cruise Control [Thermal]
Fan Settings [50]
Fan Min limit [0]
Fan Max limit [100]
CPU Fan Speed [2539 RPM]
Fan Cruise Control [Thermal]
Fan Settings [50]
Fan Min limit [0]
Fan Max limit [100]
Watchdog Function [0]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Note: *System Temperature* readout is the temperature measured by the selected sensor via *System Temperature Ext Type*. If disabled then onboard sensor (U79) is used.

Function	Selection	Description
System Temperature Ext Type	**Disabled** (Note 1) LM75 @ 0x90 OneWire @ GPIO16	Use external connected sensor instead of onboard.
Fan Cruise Control (Note 2)	Disabled Thermal Speed	Disabled = Full speed. Thermal: Regulate according to specified °C. Speed: Regulate according to specified RPM.
Fan Settings	30 – 90 (note3) 1000 – 10000 (note4)	
Fan Min limit (Note 5)	0 (note6)	Minimum PWM %, can be used to make sure fan is always active. Make sure Min limit < Max limit.
Fan Max limit (Note 5)	100 (note6)	Maximum PWM %, can be used to limit the fan noise. Make sure Min limit < Max limit.
Watchdog Function	0 - 255 (note7)	0 = Disabled. Enter the service interval in seconds before system will reset.

Note 1: When not Disabled then the *System Temperature* readout will only be valid if the sensor is physically connected to the Feature connector.

Note 2: Three sets of settings (*Fan Cruse Control*, *Fan Settings*, *Fan Min limit*, *Fan Max limit*), one set for *System Fan* and one set for *CPU Fan*. The *Fan Cruise Control* is by default *Disabled* for *System Fan* and by default *Thermal* for CPU Fan.

Note 3: °C (if *Fan Cruise Control* is *Thermal*) use either digit keys to enter value or +/- keys to increase/decrease value. Don't use mix of digit keys and +/- keys.

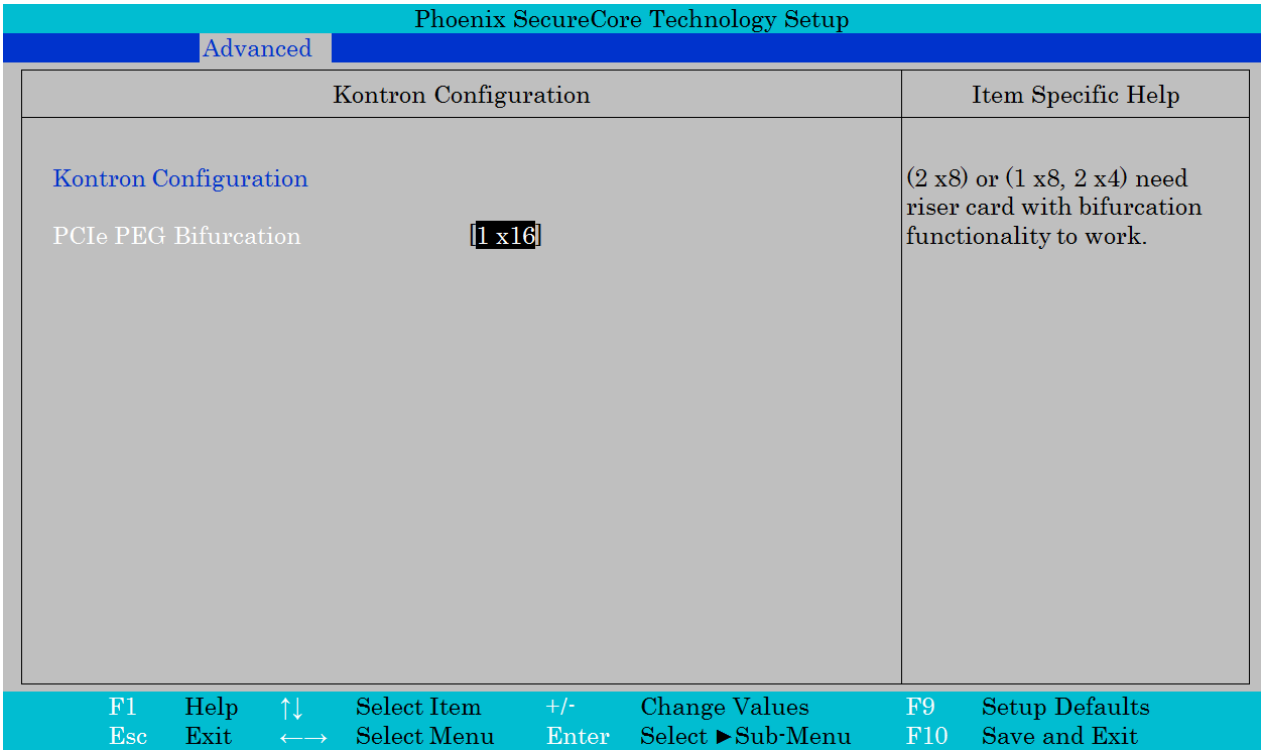
Note 4: RPM (if *Fan Cruise Control* is *Speed*) use either digit keys to enter value or +/- keys to increase/decrease value by 100. Don't use mix of digit keys and +/- keys.

Note 5: Only visible if *Fan Cruise Control* is *Thermal*.

Note6: Use number keys to enter value.

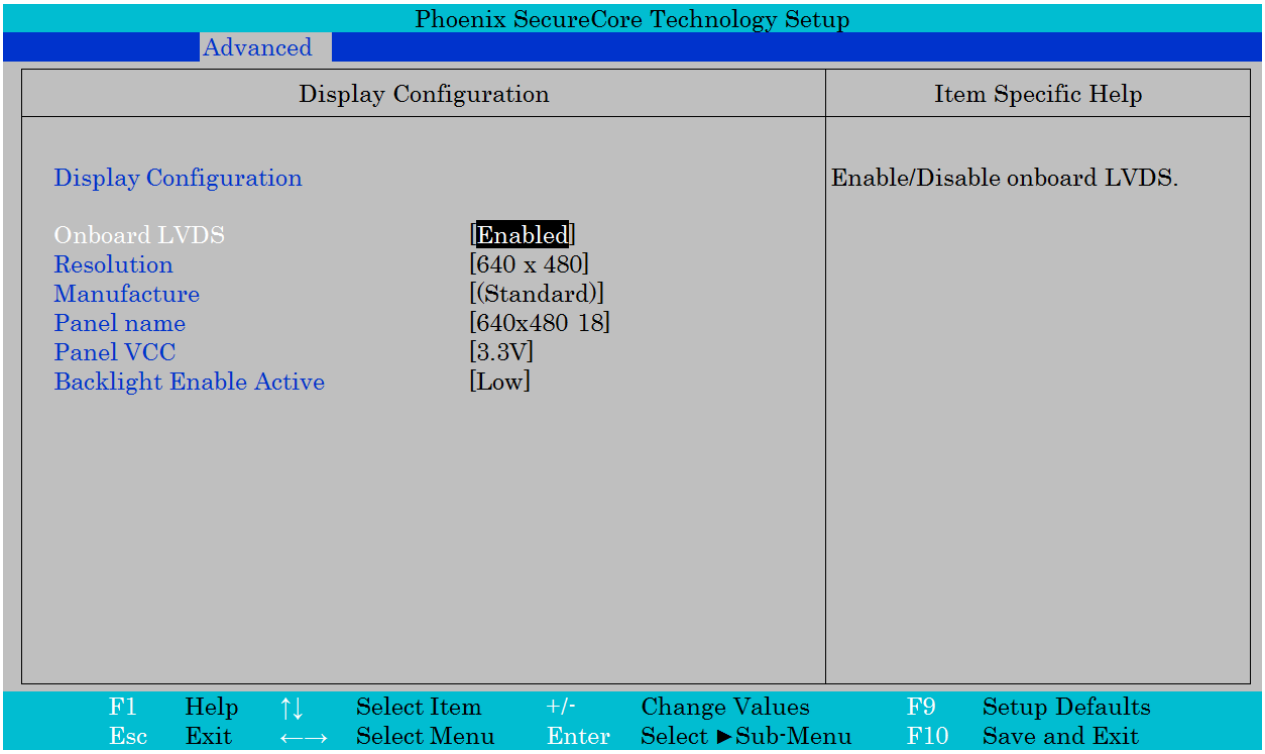
Note 7: Seconds, use digit keys to enter value. Value 0 means Watchdog is disabled. Refer to "KT-API-V2 User Manual" to control the Watchdog via API or refer to "KT-API-V2 User Manual DLL" how to control Watchdog via Windows DLL.

Kontron Configuration


Phoenix SecureCore Technology Setup
Advanced
Kontron Configuration
Item Specific Help
Kontron Configuration
PCIe PEG Bifurcation
[1 x16]
(2 x8) or (1 x8, 2 x4) need riser card with bifurcation functionality to work.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
PCIe PEG Bifurcation	**1 x16** 2 x8 1 x8, 2 x4	“2 x8” and “1 x8, 2 x4” need Riser Card with bifurcation functionality to work. Only supported on KTQM77/mITX having PCB ID 01 or above.

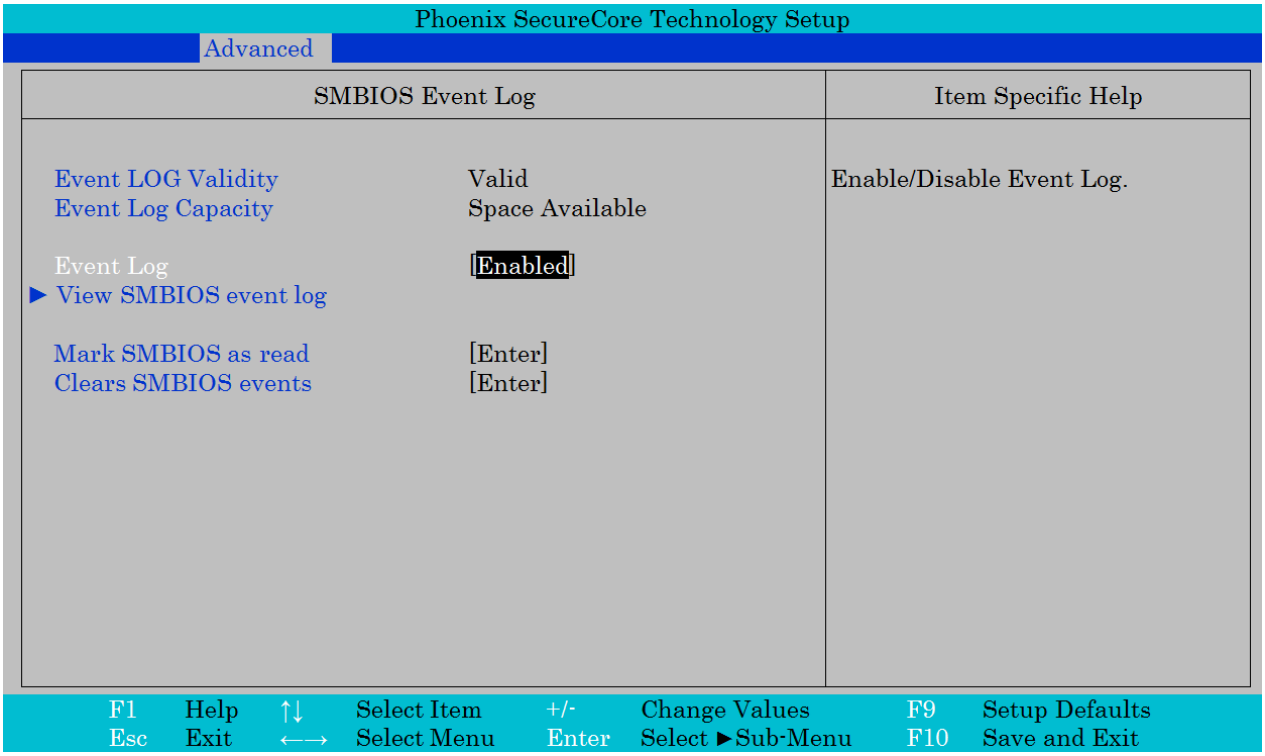
Display Configuration


Phoenix SecureCore Technology Setup
Advanced
Display Configuration
Item Specific Help
Display Configuration
Enable/Disable onboard LVDS.
Onboard LVDS [Enabled]
Resolution [640 x 480]
Manufacture [(Standard)]
Panel name [640x480 18]
Panel VCC [3.3V]
Backlight Enable Active [Low]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Onboard LVDS	**Disabled** Enabled	Enable/Disable onboard LVDS.
Resolution	**640 x 480** 800 x 480 . . . 1600 x 1200 1920 x 1080 Custom	Resolution of panel to select.
Manufacture	**(Standard)** AUO EDT Philips PrimeView Samsung	Manufacture of panel to select.
Panel name	**640x480 18** 640x480 24	Name of panel to select.
Panel VCC	**3.3V** 5V	VCC of selected panel.
Backlight Enable Active	**Low** High	Inversion of backlight signal.

Note: When Onboard LVDS is disabled then the other functions (Resolution, Manufacture etc) are not visible. All possible set of settings (“Resolution”, “Manufacture” and “Panel name”) are not listed in this Users Guide.

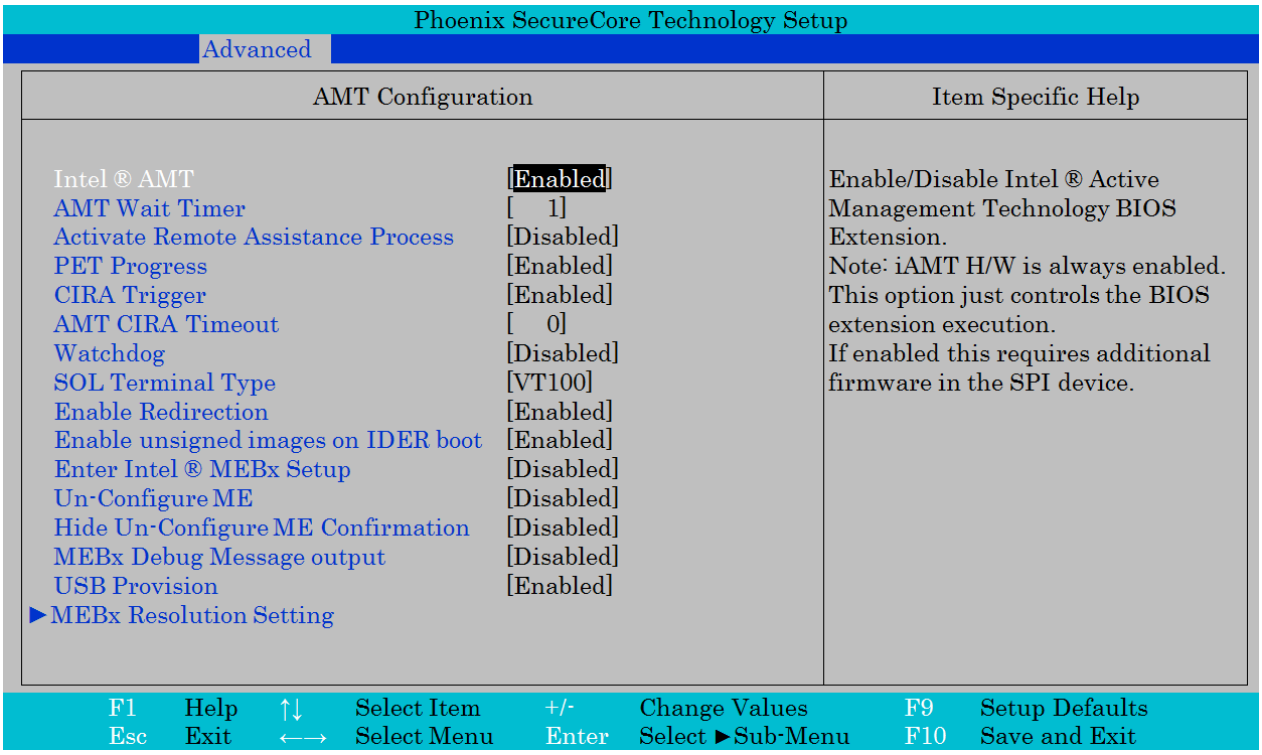
SMBIOS Event Log



Note: Entering *View SMBIOS event log* will show log only.

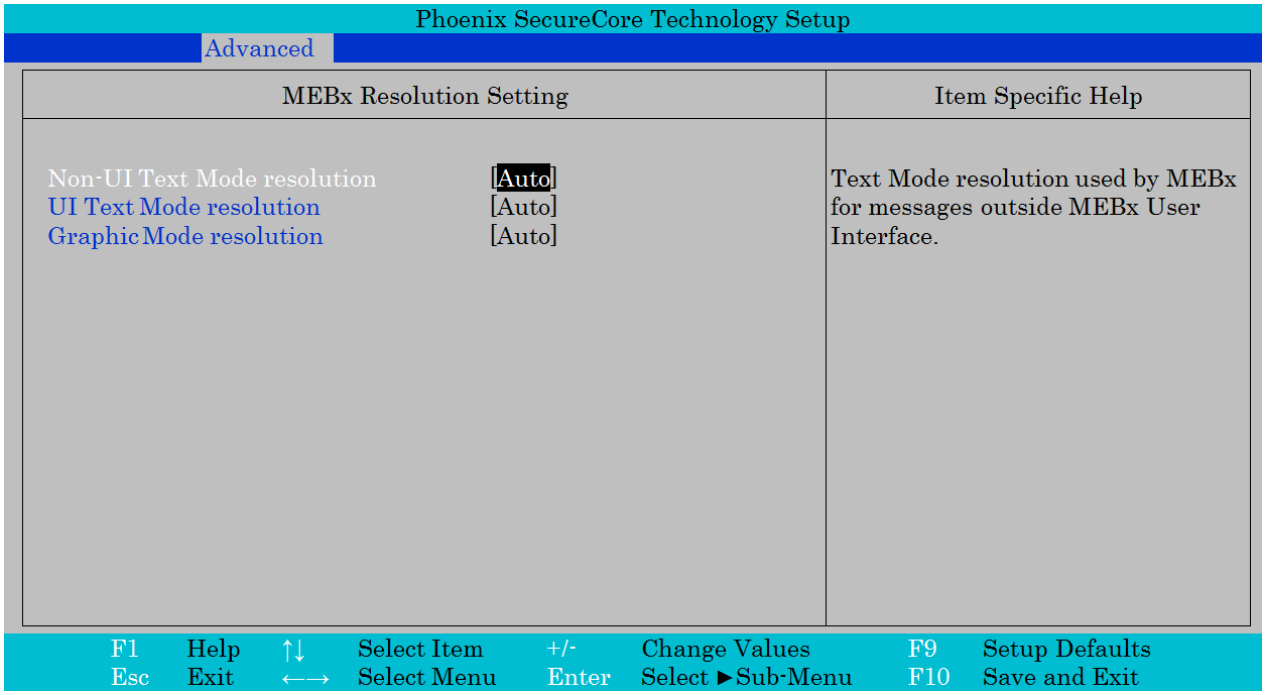
Function	Selection	Description
Event Log	Disabled **Enabled**	Enable/Disable Event Log.
Mark SMBIOS as read	Enter	Mark SMBIOS events as read. Marked SMBIOS events won't be displayed.
Clears SMBIOS events	**Enter**	Clears SMBIOS events.

AMT Configuration


Phoenix SecureCore Technology Setup
Advanced
AMT Configuration
Item Specific Help
Intel ® AMT [Enabled]
AMT Wait Timer [1]
Activate Remote Assistance Process [Disabled]
PET Progress [Enabled]
CIRA Trigger [Enabled]
AMT CIRA Timeout [0]
Watchdog [Disabled]
SOL Terminal Type [VT100]
Enable Redirection [Enabled]
Enable unsigned images on IDER boot [Enabled]
Enter Intel ® MEBx Setup [Disabled]
Un-Configure ME [Disabled]
Hide Un-Configure ME Confirmation [Disabled]
MEBx Debug Message output [Disabled]
USB Provision [Enabled]
▶MEBx Resolution Setting
Enable/Disable Intel ® Active Management Technology BIOS Extension.
Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution.
If enabled this requires additional firmware in the SPI device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

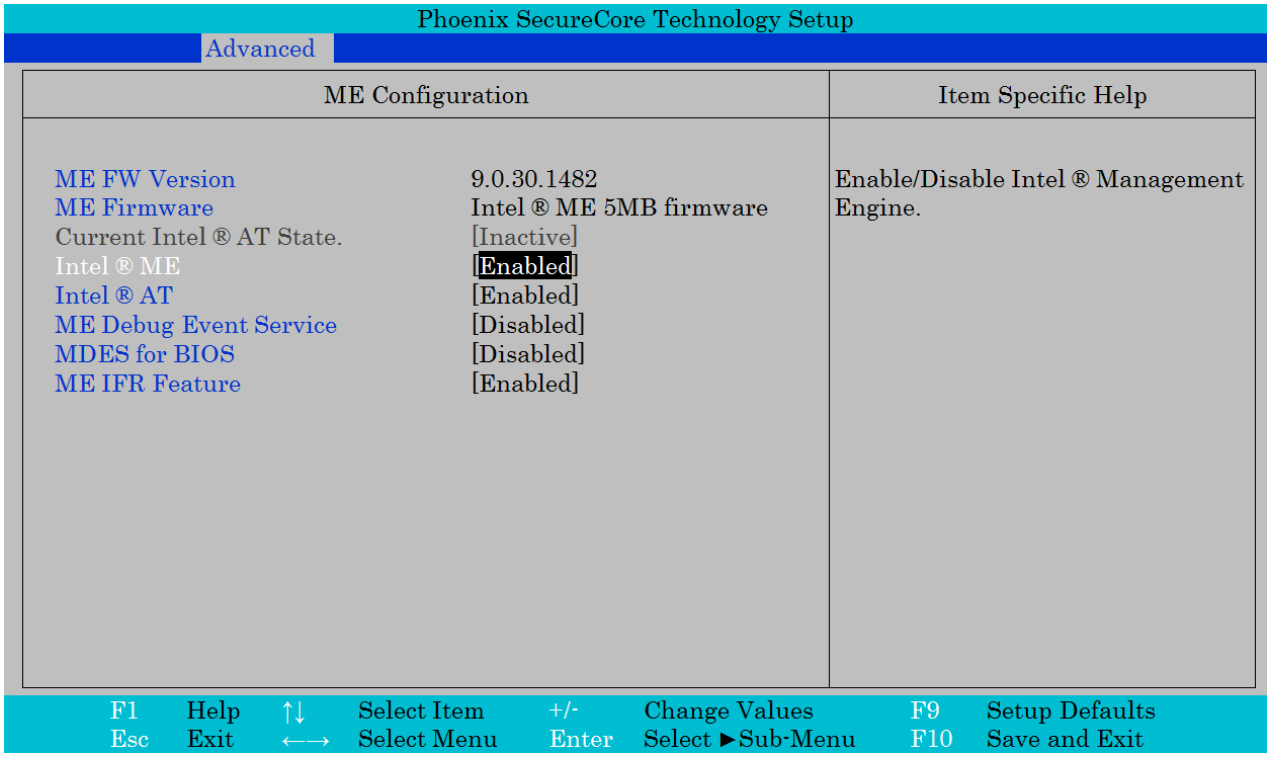
Function	Selection	Description
Intel ® AMT	Disabled **Enabled**	Enable/Disable Intel ® Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled this requires additional firmware in the SPI.
AMT Wait Timer	0,**1**,...300	Set timer to wait before sending ASF_GET_BOOT_OPTIONS.
Activate Remote Assistance Process	**Disabled** Enabled	Trigger CIRA boot
PET Progress	Disabled **Enabled**	Users can Enable/Disable PET Events progress to receive PET events or not.
CIRA Trigger	Disabled **Enabled**	Enable/Disable Trigger for Remote Assistance Process using HotKey.
AMT CIRA Timeout	**0**,...255	OEM defined timeout for the MPS connection to establish.
Watchdog	Disabled **Enabled**	Enable/Disable Watchdog Timer.
SOL Terminal Type	ANSI **VT100** VT100+ UTF8	Set Terminal Type for Serial Over LAN Session.
Enable Redirection	Disabled **Enabled**	Enable/Disable Redirection.
Enable unsigned images on IDER boot	Disabled **Enabled**	Enable the BIOS to boot from an unsigned image even when secure boot is enabled.
Enter Intel ® MEBx Setup	**Disabled** Enabled	Enter Intel ® MEBx Setup on the next boot.
Un-Configure ME	**Disabled** Enabled	Un-Configure ME without a password.
Hide Un-Configure ME Confirmation	**Disabled** Enabled	Hide Un-Configure ME Confirmation without password Confirmation Prompt.
MEBx Debug Message output	**Disabled** Enabled	Enable/Disable MEBx Debug Message output.
USB Provision	Disabled **Enabled**	Enable/Disable USB Provision function.

MEBx Resolution Setting


Phoenix SecureCore Technology Setup
Advanced
MEBx Resolution Setting
Item Specific Help
Non-UI Text Mode resolution
[Auto]
UI Text Mode resolution
[Auto]
Graphic Mode resolution
[Auto]
Text Mode resolution used by MEBx for messages outside MEBx User Interface.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

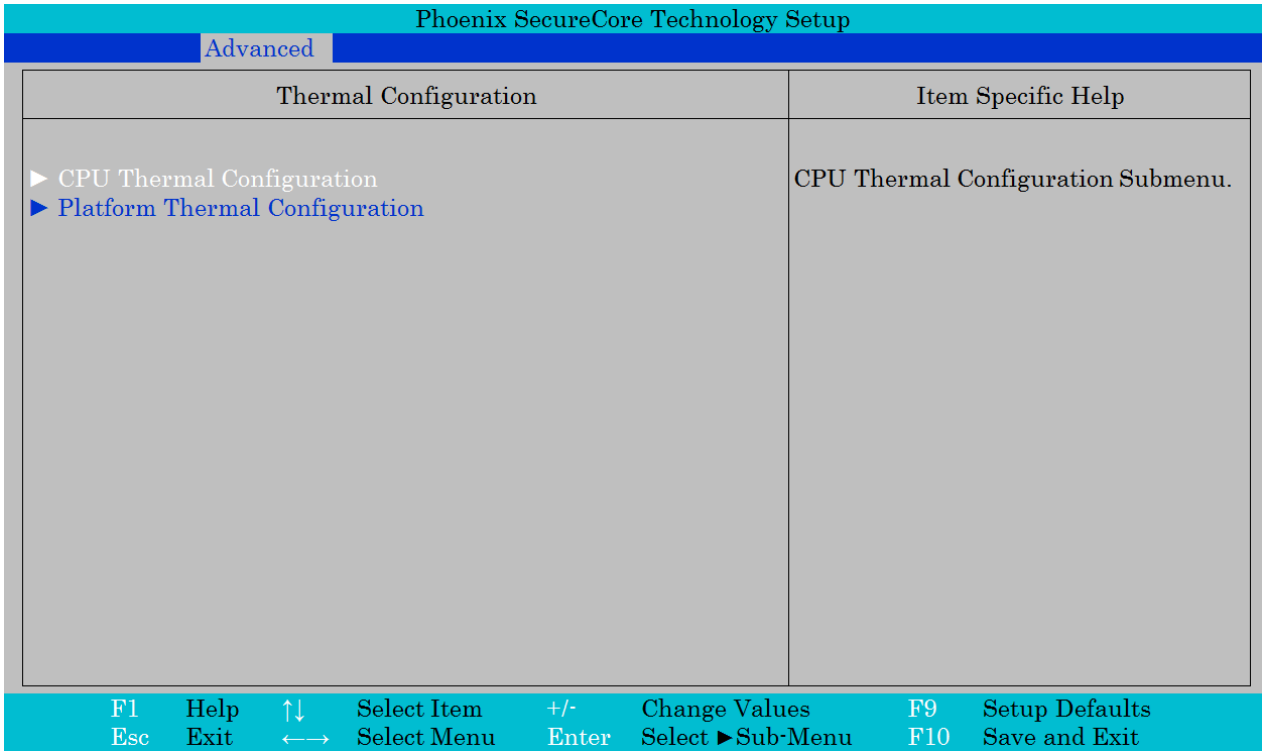
Function	Selection	Description
Non-UI Text Mode resolution	**Auto** 80X25 100X31	Text Mode resolution used by MEBx for messages outside MEBx User Interface.
UI Text Mode resolution	**Auto** 80X25 100X31	Text Mode resolution used by MEBx to display the User Interface forms.
Graphic Mode resolution	**Auto** 640X480 800X600 1024X768	Graphic Mode resolution used by MEBx to display boxes like consent sprite.

ME Configuration

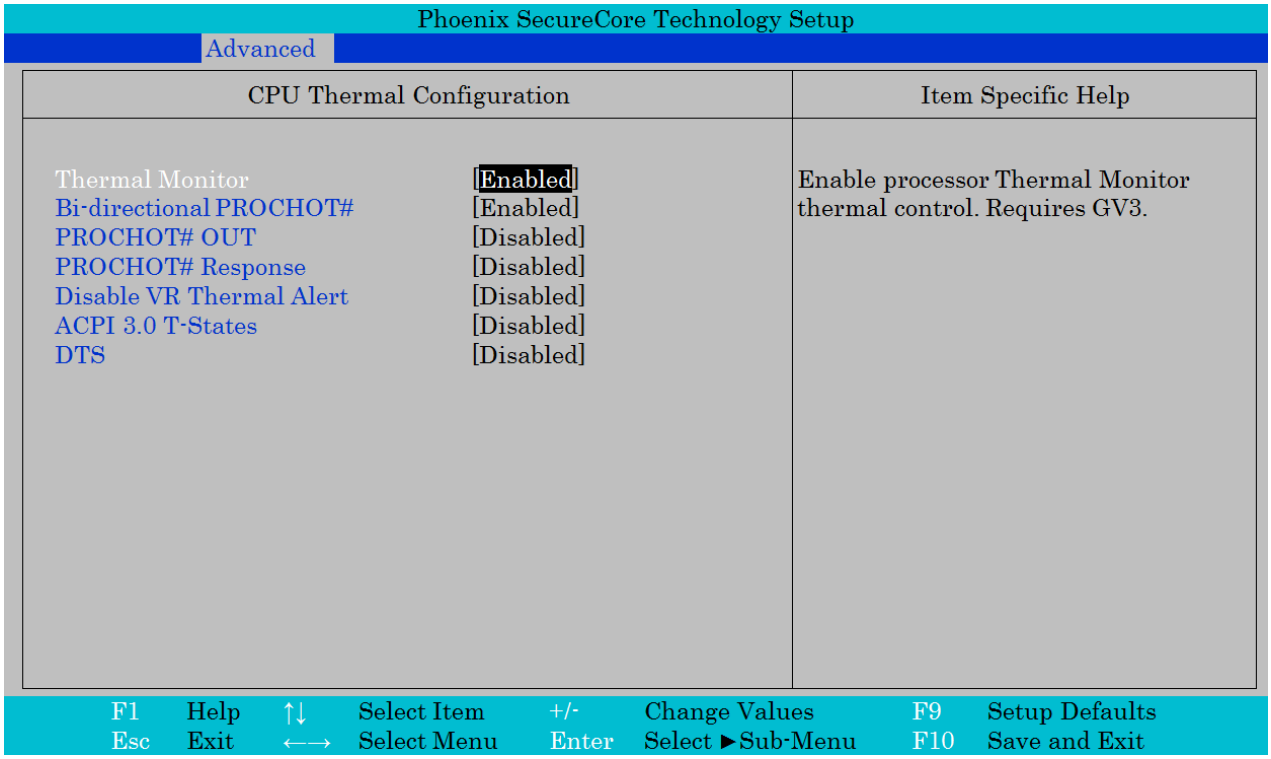

Phoenix SecureCore Technology Setup
Advanced
ME Configuration
Item Specific Help
ME FW Version 9.0.30.1482
ME Firmware Intel ® ME 5MB firmware
Current Intel ® AT State. [Inactive]
Intel ® ME [Enabled]
Intel ® AT [Enabled]
ME Debug Event Service [Disabled]
MDES for BIOS [Disabled]
ME IFR Feature [Enabled]
Enable/Disable Intel ® Management Engine.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Intel ® ME	Disabled **Enabled**	Enable/Disable Intel ® Management Engine.
Intel ® AT	Disabled **Enabled**	Enable/Disable Intel ® Anti-Theft Technology.
ME Debug Event Service	**Disabled** Enabled	Enable/Disable ME Debug Event Service.
MDES for BIOS	**Disabled** Enabled	Enable/Disable ME Debug Event Service for BIOS events.
ME IFR Feature	Disabled **Enabled**	Enable/Disable Intel ® ME Independent Firmware Recovery.

Thermal Configuration

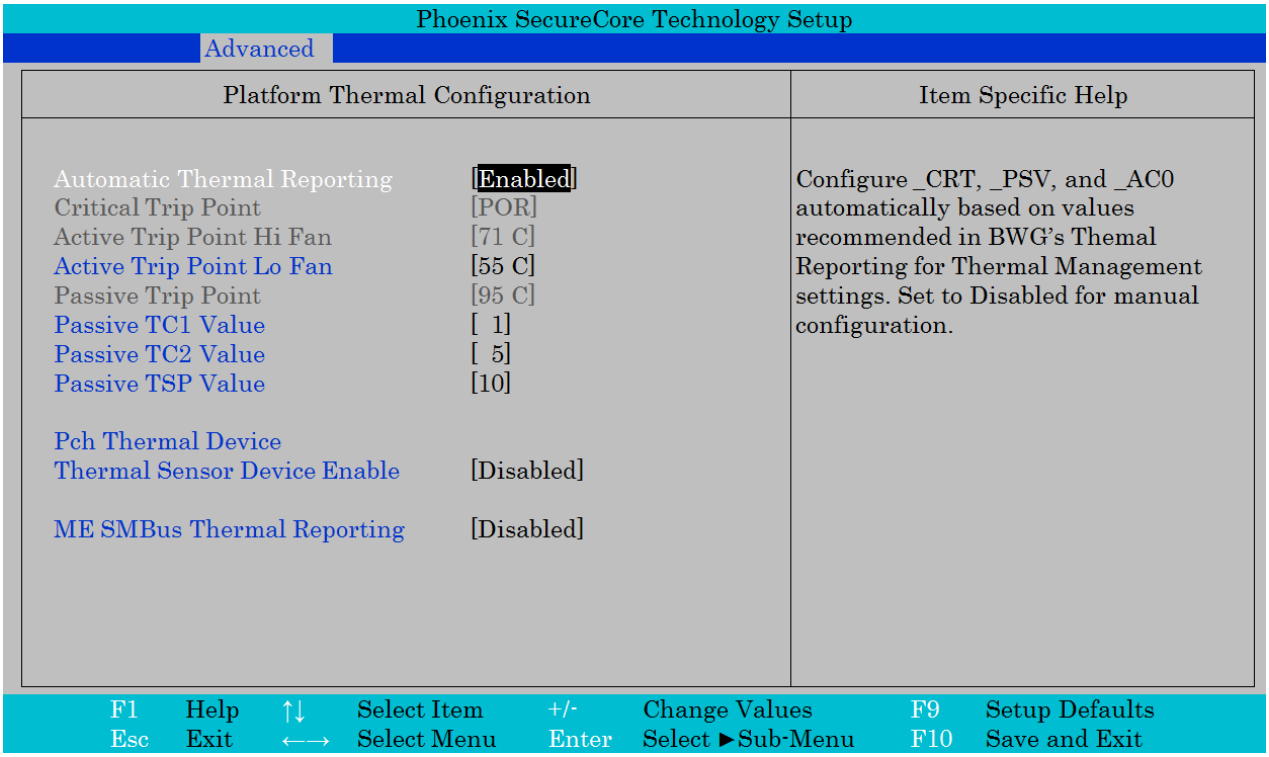

Phoenix SecureCore Technology Setup
Advanced
Thermal Configuration
Item Specific Help
► CPU Thermal Configuration
► Platform Thermal Configuration
CPU Thermal Configuration Submenu.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ►Sub-Menu F10 Save and Exit

CPU Thermal Configuration


Phoenix SecureCore Technology Setup
Advanced
CPU Thermal Configuration
Item Specific Help
Thermal Monitor [Enabled]
Bi-directional PROCHOT# [Enabled]
PROCHOT# OUT [Disabled]
PROCHOT# Response [Disabled]
Disable VR Thermal Alert [Disabled]
ACPI 3.0 T-States [Disabled]
DTS [Disabled]
Enable processor Thermal Monitor thermal control. Requires GV3.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

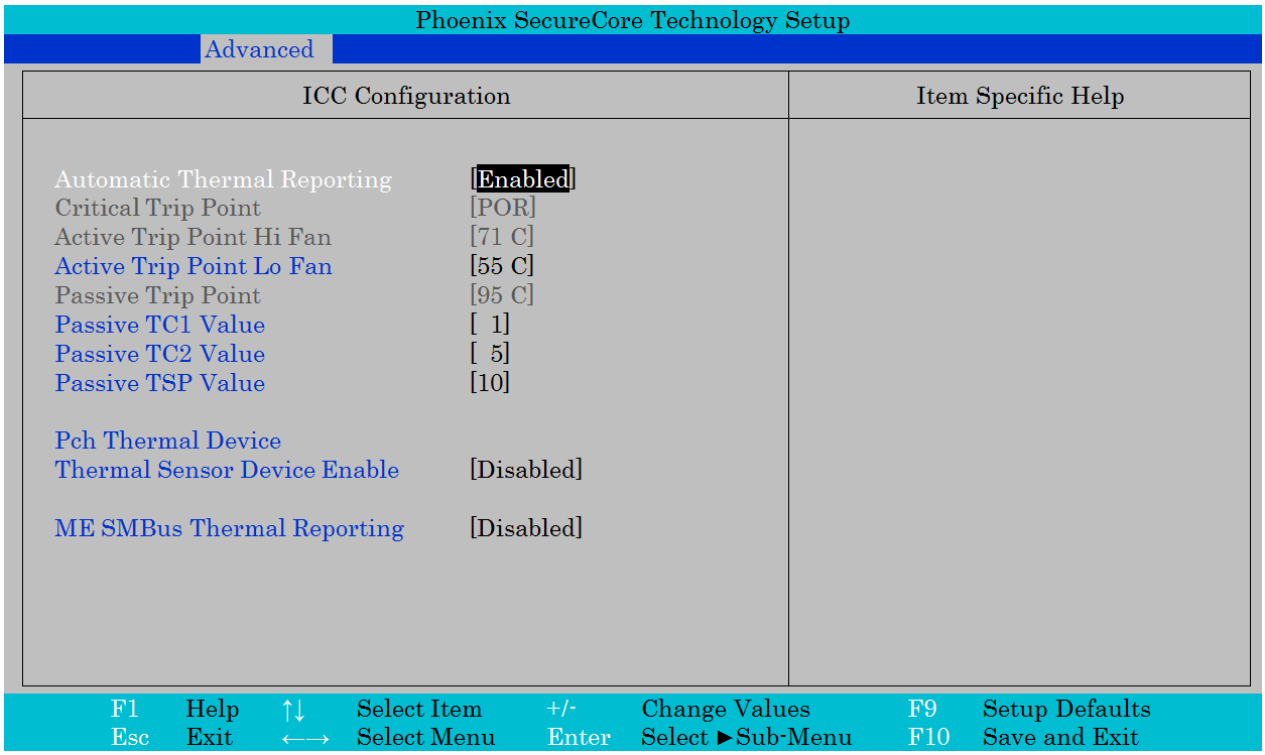
Function	Selection	Description
Thermal Monitor	Disabled **Enabled**	Enable processor Thermal Monitor thermal control. Requires GV3.
Bi-directional PROCHOT#	Disabled **Enabled**	When a processor thermal sensor trips (either core), the PROCHOT# is driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.
PROCHOT# OUT	**Disabled** Enabled	If bi-directional PROCHOT# is enabled, PROCHOT# OUT can be disabled selectively.
PROCHOT# Response	**Disabled** Enabled	Enable/Disable PROCHOT Response.
Disable VR Thermal Alert	**Disabled** Enabled	Enable/Disable VR Thermal Alert.
ACPI 3.0 T-States	**Disabled** Enabled	Enable/Disable ACPI 3.0 T-States.
DTS	**Disabled** Enabled Out of Spec Only	Enable CPU Digital Thermal Sensor function.

Platform Thermal Configuration


Phoenix SecureCore Technology Setup
Advanced
Platform Thermal Configuration
Item Specific Help
Automatic Thermal Reporting [Enabled]
Critical Trip Point [POR]
Active Trip Point Hi Fan [71 C]
Active Trip Point Lo Fan [55 C]
Passive Trip Point [95 C]
Passive TC1 Value [1]
Passive TC2 Value [5]
Passive TSP Value [10]
Pch Thermal Device
Thermal Sensor Device Enable [Disabled]
ME SMBus Thermal Reporting [Disabled]
Configure _CRT, _PSV, and _AC0 automatically based on values recommended in BWG's Themal Reporting for Thermal Management settings. Set to Disabled for manual configuration.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

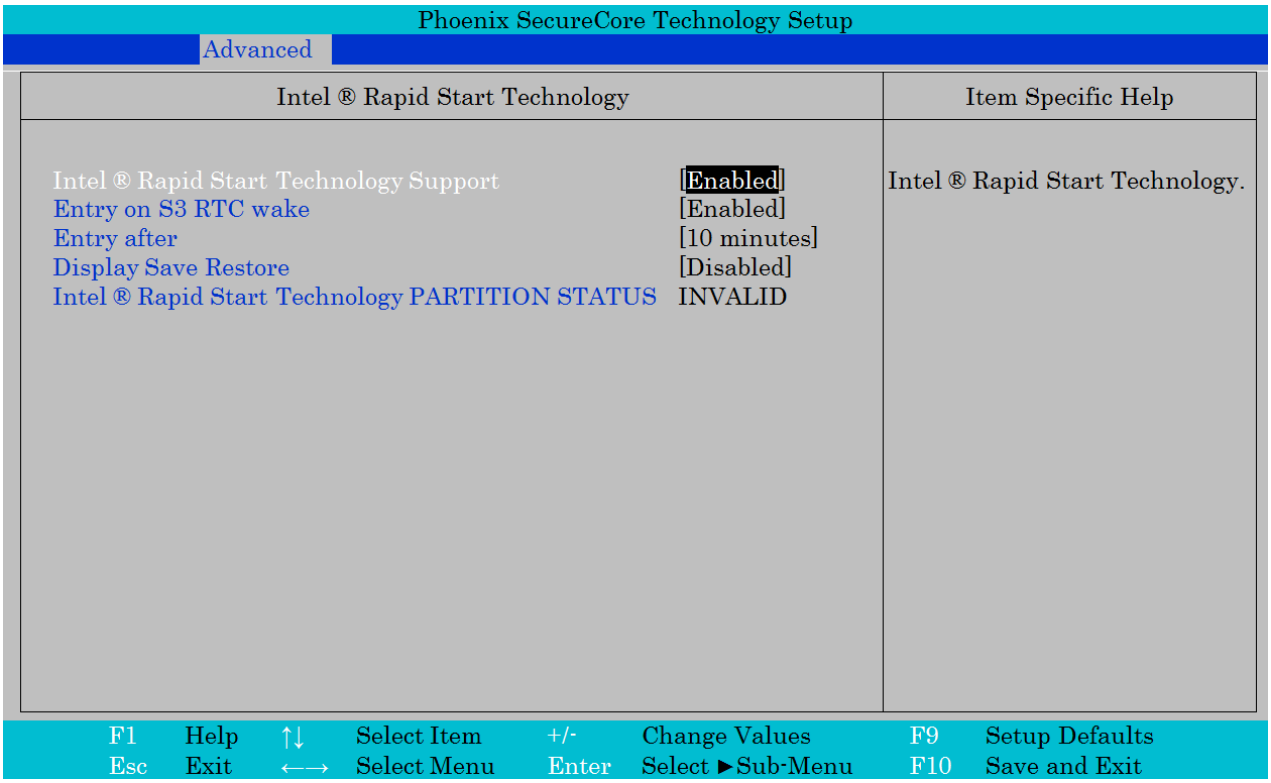
Function	Selection	Description
Automatic Thermal Reporting	Disabled **Enabled**	Configure _CRT, _PSV, and _AC0 automatically based on values recommended in BWG's Themal Reporting for Thermal Management settings. Set to Disabled for manual configuration.
Active Trip Point Lo Fan	15, 23,...**55**,...119	This value controls the temperature of the ACPI Active Trip Point – the point where the OS turns the processor fan on low.
Passive TC1 Value	**1**,2, ...16	This value sets the TC1 value for the ACPI Passive Cooling Formula. Use "+" and "-" keys to change value.
Passive TC2 Value	1,2, ...,**5**,...16	This value sets the TC2 value for the ACPI Passive Cooling Formula. Use "+" and "-" keys to change value.
Passive TSP Value	2,4, ...,**10**,...32	This value sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenths of a second how often the OS reads the temperature when passive cooling is enabled. Use "+" and "-" keys to change value.
Thermal Sensor Device Enable	**Disabled** Enabled	Enable Thermal Sensor Device.
ME SMBus Thermal Reporting	**Disabled** Enabled	Enable/Disable ME SMBus Thermal Reporting Configuration.

ICC Configuration


Phoenix SecureCore Technology Setup
Advanced
ICC Configuration
Item Specific Help
Automatic Thermal Reporting [Enabled]
Critical Trip Point [POR]
Active Trip Point Hi Fan [71 C]
Active Trip Point Lo Fan [55 C]
Passive Trip Point [95 C]
Passive TC1 Value [1]
Passive TC2 Value [5]
Passive TSP Value [10]
Pch Thermal Device
Thermal Sensor Device Enable [Disabled]
ME SMBus Thermal Reporting [Disabled]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Automatic Thermal Reporting	Disabled **Enabled**	Configure _CRT, _PSV, and _AC0 automatically based on values recommended in BWG's Themal Reporting for Thermal Management settings. Set to Disabled for manual configuration.
Active Trip Point Lo Fan	15, 23,...**55**,...119	This value controls the temperature of the ACPI Active Trip Point – the point where the OS turns the processor fan on low.
Passive TC1 Value	**1**,2, ...16	This value sets the TC1 value for the ACPI Passive Cooling Formula. Use "+" and "-" keys to change value.
Passive TC2 Value	1,2, ...,**5**,...16	This value sets the TC2 value for the ACPI Passive Cooling Formula. Use "+" and "-" keys to change value.
Passive TSP Value	2,4, ...,**10**,...32	This value sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenths of a second how often the OS reads the temperature when passive cooling is enabled. Use "+" and "-" keys to change value.
Thermal Sensor Device Enable	**Disabled** Enabled	Enable Thermal Sensor Device.
ME SMBus Thermal Reporting	**Disabled** Enabled	Enable/Disable ME SMBus Thermal Reporting Configuration.

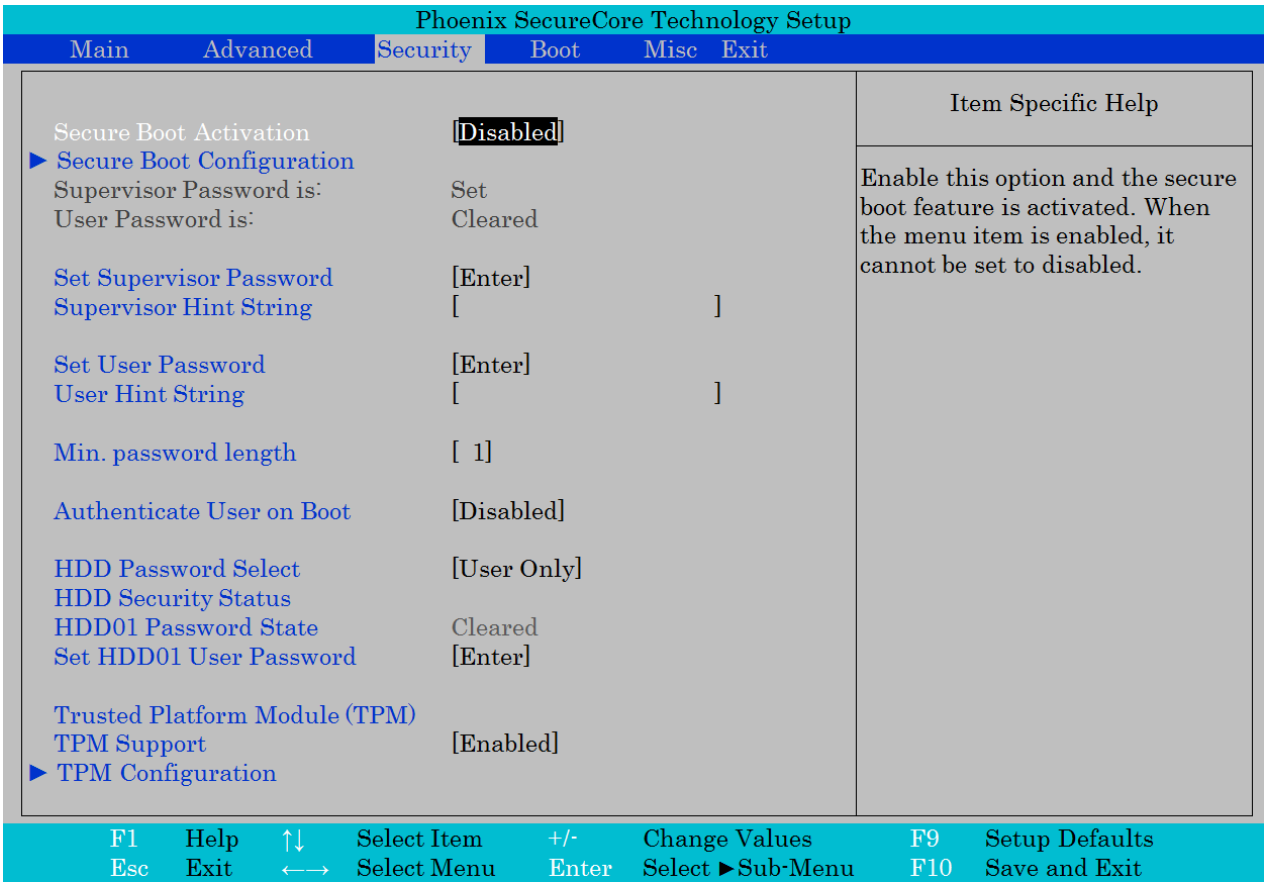
Intel ® Rapid Start Technology


Phoenix SecureCore Technology Setup
Advanced
Intel ® Rapid Start Technology
Item Specific Help
Intel ® Rapid Start Technology Support [Enabled]
Entry on S3 RTC wake [Enabled]
Entry after [10 minutes]
Display Save Restore [Disabled]
Intel ® Rapid Start Technology PARTITION STATUS INVALID
Intel ® Rapid Start Technology.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
Intel ® Rapid Start Technology Support	**Disabled** Enabled	Intel ® Rapid Start Technology.
Entry on S3 RTC wake (Note1)	Disabled **Enabled**	Intel ® Rapid Start Technology invocation upon S3 RTC wake.
Entry after (Note1)	Immediately 1 minute 2 minutes 5 minutes 10 minutes 15 minutes 30 minutes 1 hour 2 hours	Enable RTC wake timer at S3 entry.
Display Save Restore (Note1)	**Disabled** Enabled	Display Save Restore Configured.

Note1: only visible if “Intel ® Rapid Start Technology Support” is “Enabled”.

10.3 Security

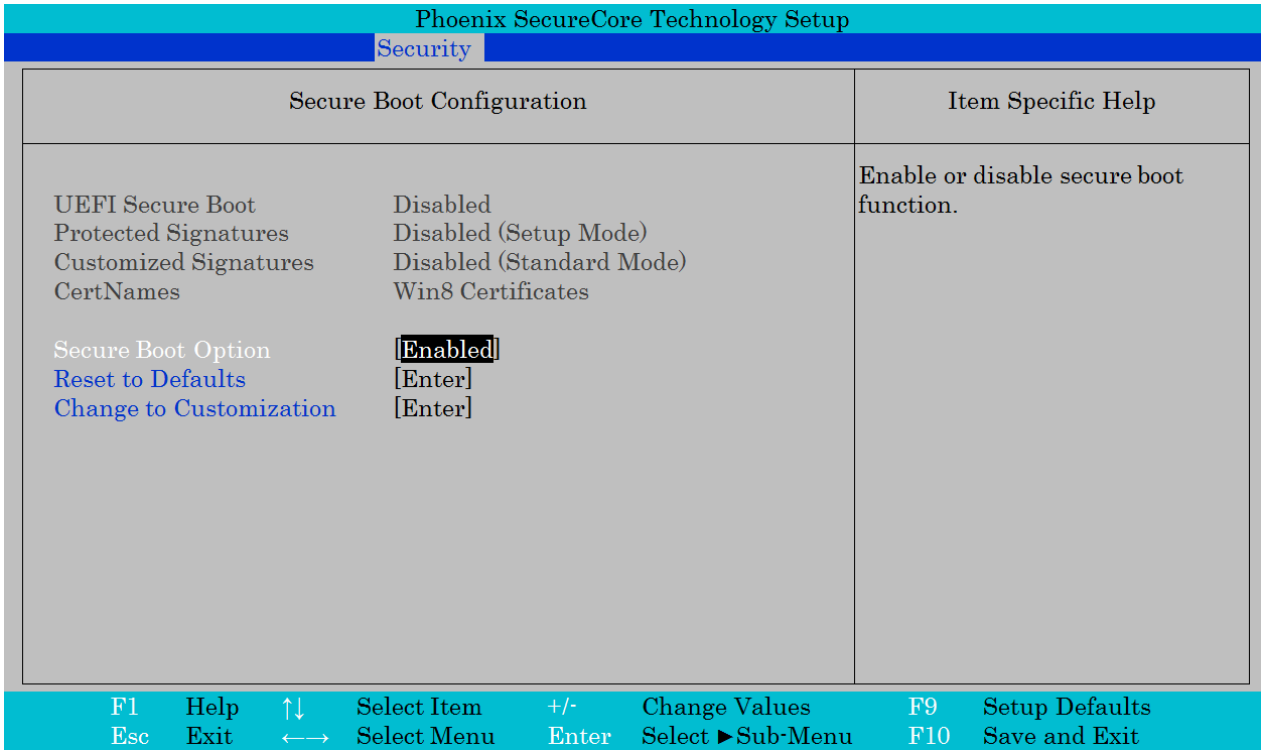

Phoenix SecureCore Technology Setup
Main Advanced Security Boot Misc Exit
Item Specific Help
Secure Boot Activation [Disabled]
▶ Secure Boot Configuration
Supervisor Password is: Set
User Password is: Cleared
Set Supervisor Password [Enter]
Supervisor Hint String [ ]
Set User Password [Enter]
User Hint String [ ]
Min. password length [1]
Authenticate User on Boot [Disabled]
HDD Password Select [User Only]
HDD Security Status
HDD01 Password State Cleared
Set HDD01 User Password [Enter]
Trusted Platform Module (TPM)
TPM Support [Enabled]
▶ TPM Configuration
Enable this option and the secure boot feature is activated. When the menu item is enabled, it cannot be set to disabled.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Note "Secure Boot Configuration" and "TPM Configuration" see next pages.

Function	Selection	Description
Secure Boot Activation (Note1)	**Disabled** Enabled	Enable this option and the secure boot feature is activated. When the menu item is enabled, it cannot be set to disabled.
Set Supervisor Password	(up to 20 characters)	Set or clear the Supervisor account's password.
Supervisor Hint String	(up to 20 characters)	Press Enter to type Supervisor Hint String.
Set User Password (Note1)	(up to 20 characters)	Set or clear the User account's password.
User Hint String (Note1)	(up to 20 characters)	Press Enter to type User Hint String.
Min. password length	**1**, 2, ..., 20	Set the minimum number of characters for password (1-20).
Authenticate User on Boot (Note1)	**Disabled** Enabled	Enable/Disable User Authenticate Prompt on Boot.
HDD Password Select	User+Master **User Only**	Supports user only or both user and master password.
Set HDD01 User Password	Enter	Set HDD01 User Password.
TPM Support	Disabled **Enabled**	This is used to decide whether TPM support should be enabled or disabled.

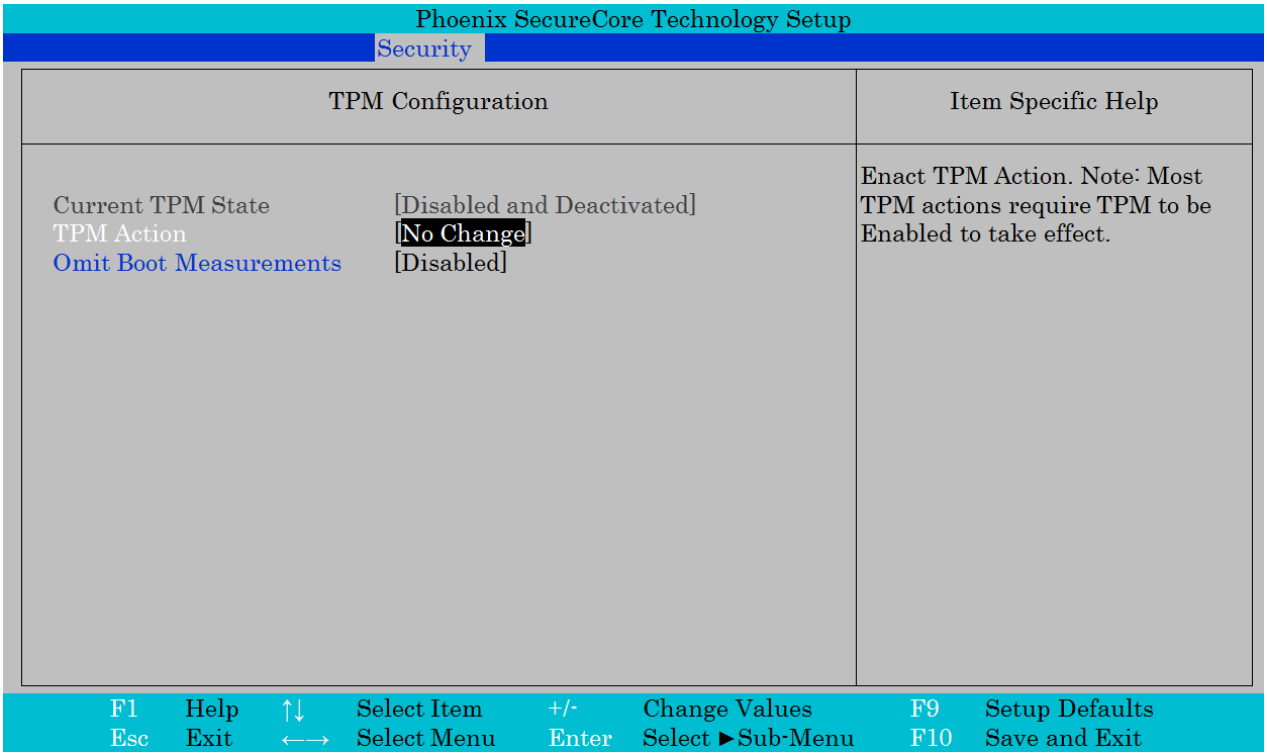
Note 1: Only selectable if "Supervisor Password" is set.

Secure Boot Configuration


Phoenix SecureCore Technology Setup
Security
Secure Boot Configuration
Item Specific Help
Enable or disable secure boot function.
UEFI Secure Boot Disabled
Protected Signatures Disabled (Setup Mode)
Customized Signatures Disabled (Standard Mode)
CertNames Win8 Certificates
Secure Boot Option [Enabled]
Reset to Defaults [Enter]
Change to Customization [Enter]
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

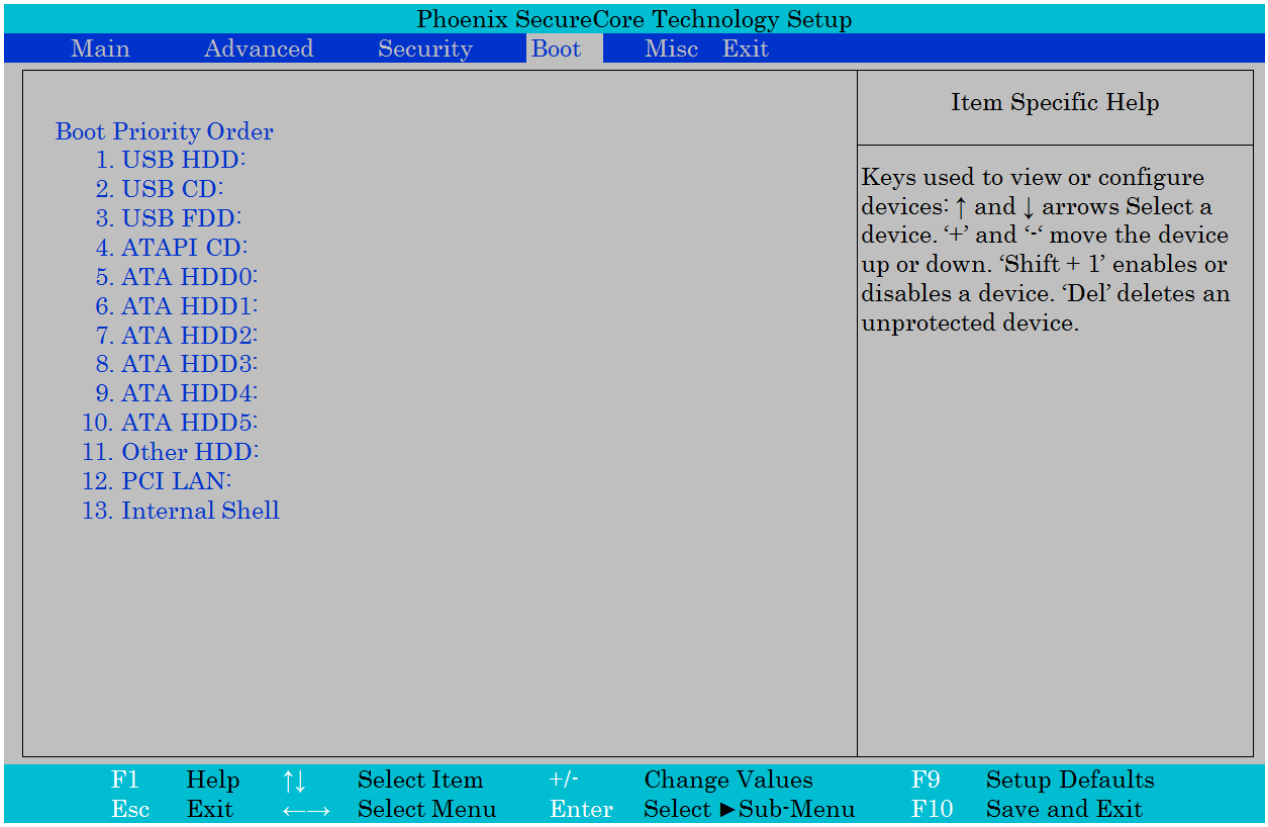
Function	Selection	Description
Secure Boot Option	Disabled **Enabled**	Enable or disable secure boot function.
Reset to Defaults	Enter	Reset secure boot variables to manufacturing defaults.
Change to Customization	Enter	PK will be deleted, the platform will be changed to setup mode, and secure boot is disabled automatically.

TPM Configuration

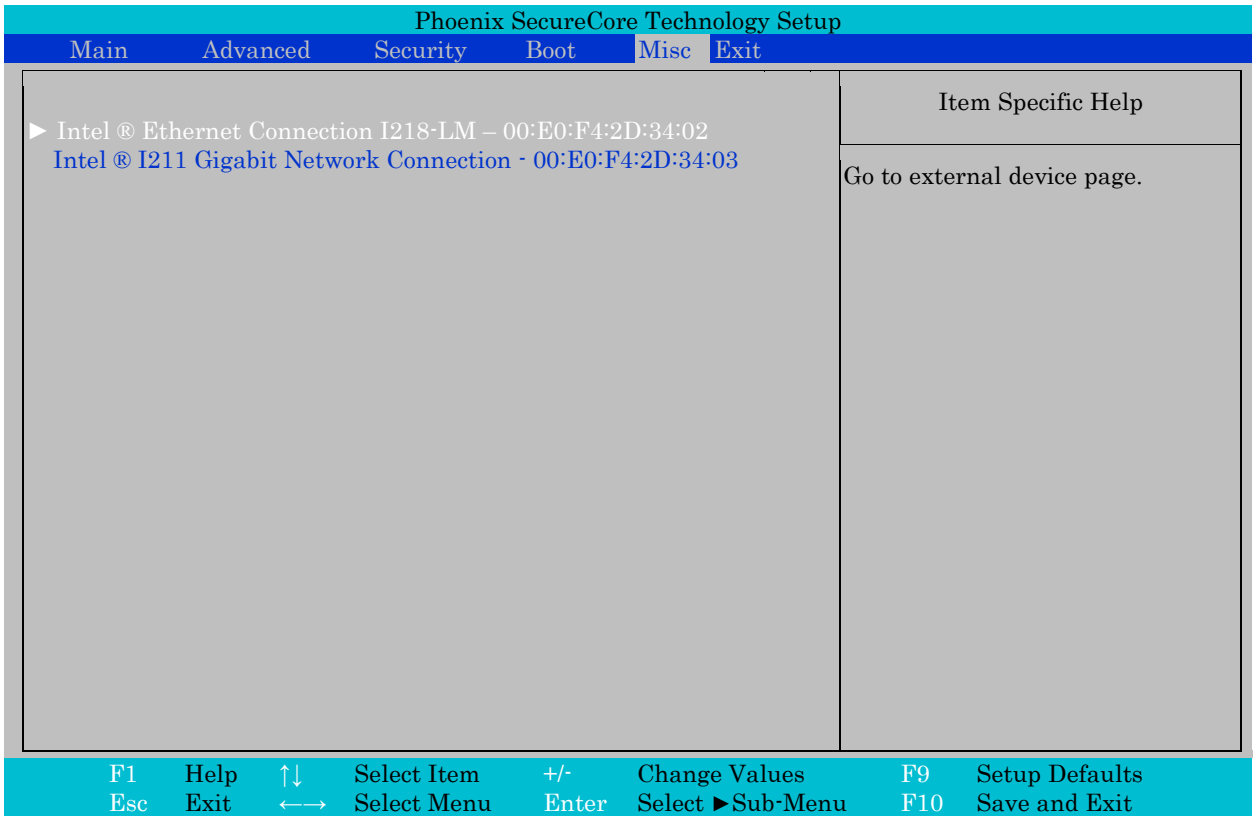

Phoenix SecureCore Technology Setup
Security
TPM Configuration
Item Specific Help
Current TPM State [Disabled and Deactivated]
TPM Action [No Change]
Omit Boot Measurements [Disabled]
Enact TPM Action. Note: Most TPM actions require TPM to be Enabled to take effect.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Selection	Description
TPM Action	No Change Enable Disable Activate Deactivate Clear Enable and Activate Disable and Deactivate Set Owner Install, with State=True Set Owner Install, with State=False Enable, Activate, and Set Owner Install, with State=True Disable, Deactivate, and Set Owner Install, with State=False Clear, Enable, and Activate Require PP for provisioning Do not require PP for provisioning Require PP for clear Do not require PP for clear Enable, Activate, and Clear Enable, Activate, Clear, Enable, and Activate	Enact TPM Action. Note: Most TPM actions require TPM to be Enabled to take effect.
TPM Support	**Disabled** Enabled	Enabling this option causes the system to omit recording boot device attempts in PCR[4].

10.4 Boot

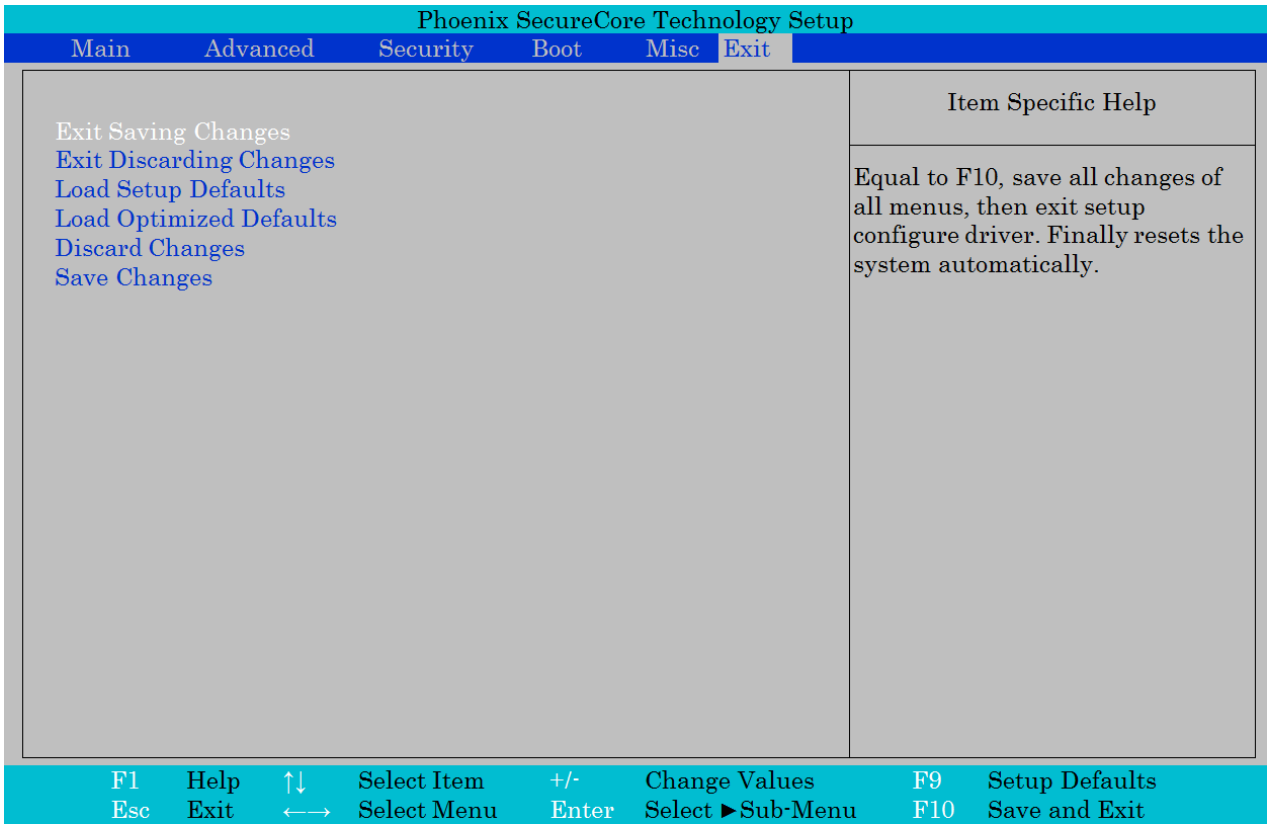

Phoenix SecureCore Technology Setup
Main Advanced Security Boot Misc Exit
Boot Priority Order
1. USB HDD:
2. USB CD:
3. USB FDD:
4. ATAPI CD:
5. ATA HDD0:
6. ATA HDD1:
7. ATA HDD2:
8. ATA HDD3:
9. ATA HDD4:
10. ATA HDD5:
11. Other HDD:
12. PCI LAN:
13. Internal Shell
Item Specific Help
Keys used to view or configure devices: ↑ and ↓ arrows Select a device. '+' and '-' move the device up or down. 'Shift + 1' enables or disables a device. 'Del' deletes an unprotected device.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

10.5 Misc


Phoenix SecureCore Technology Setup
Main Advanced Security Boot Misc Exit
► Intel ® Ethernet Connection I218-LM – 00:E0:F4:2D:34:02
Intel ® I211 Gigabit Network Connection - 00:E0:F4:2D:34:03
Item Specific Help
Go to external device page.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ►Sub-Menu F10 Save and Exit

Note: This menu contains dynamic driver settings and possibly other settings. Don't change these settings. This menu might be removed in future BIOS version.

10.6 Exit


Phoenix SecureCore Technology Setup
Main Advanced Security Boot Misc Exit
Exit Saving Changes
Exit Discarding Changes
Load Setup Defaults
Load Optimized Defaults
Discard Changes
Save Changes
Item Specific Help
Equal to F10, save all changes of all menus, then exit setup configure driver. Finally resets the system automatically.
F1 Help ↑↓ Select Item +/- Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶Sub-Menu F10 Save and Exit

Function	Description
Exit Saving Changes	Equal to F10, save all changes of all menus, then exit setup configure driver. Finally resets the system automatically.
Exit Discarding Changes	Equal to ESC, never save changes, then exit setup configure driver.
Load Setup Defaults	Equal to F9. Load standard defaults values.
Load Optimized Defaults	Load settings for optimized boot time and system performance.
Discard Changes	Load the original value of this boot time. Not the default Setup value.
Save Changes	Save all changes of all menus, but do not reset system.